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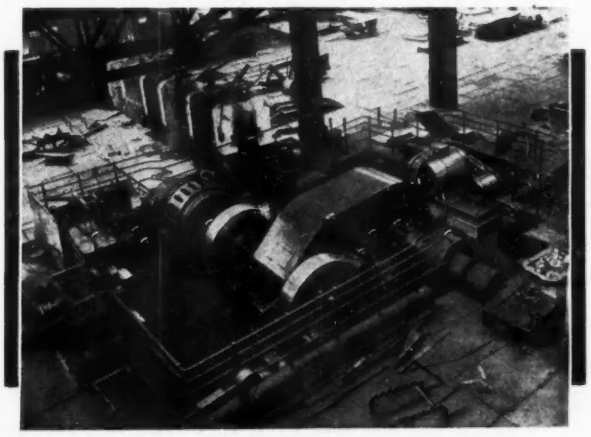

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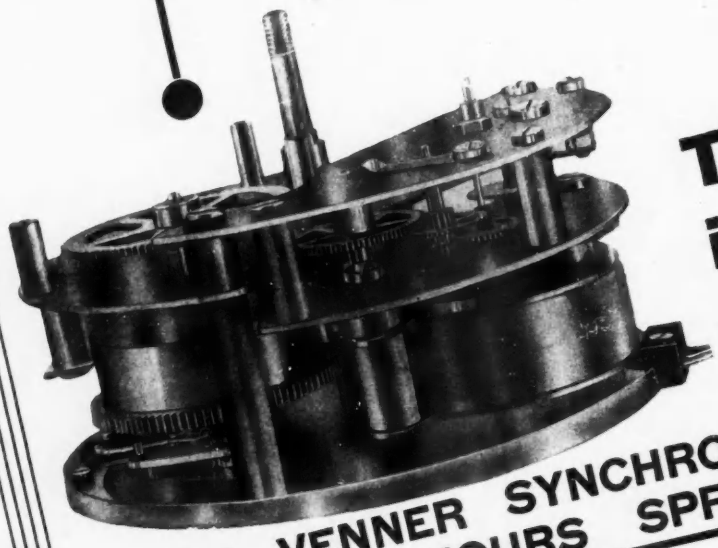

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The
Electrical Review

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Problems of Reliability

AN instructive commentary on certain trends in modern generation and distribution practice may be inferred from the particulars now available of the recent breakdown on the system of the New York Edison Co., regarding which Mr. W. H. Lawrence, the company's chief operating engineer, has kindly sent us information. Much also is to be learned, no doubt, from the failure at Bradford last Monday, but sufficient details are not at the moment available to permit conclusions to be usefully drawn.

Physical limits of space prescribe the concentration of power production, if electricity is to be used to the extent to which it is used in New York. The energy behind a short circuit may, therefore, be very great and may also be increased by interconnection with other stations. The relative influence of inter-linking becomes less, however, as the capacity of the station increases. There is no reason to suppose that it aggravated the trouble at Hell Gate station, and 360,000 kW of generators (out of 600,000 kW installed), even though connected to two independent 13.5-kV bus-bars, was quite enough to account for the severity of the effects of a bus-bar earth.

Fire destroyed all evidence of the origin of this fault, as it has at Bradford, but the occurrence, immediately afterwards, of a phase fault on an independent bus-bar section, at a point which was separated by fireproof walls, indicates unsuspected weaknesses in the phase-separated type of switchgear employed. It seems to bear out the opinion expressed at the I.E.E. discussion last week that had ironclad circuit-breakers been installed, a breakdown of the kind experienced at Hell Gate would not have happened.

A disturbing feature was the non-functioning of the control and indicating circuits due to fault current passing through them. All generators had to be switched out by hand, and the station was completely shut down for several hours.

Nevertheless, supplies were maintained or were quickly restored to all but 2 per cent. of the two million consumers by means of the interconnectors with the other four stations in parallel. This small percentage, however, represented 40,000 consumers, and the interruption was prolonged in a few cases for eleven hours. The obstacle to complete restoration before this lapse of time was the overloading of and damage to low-voltage mains and transformers, which entailed elaborate emergency sub-division of the network and the opening and subsequent reclosing of consumers' switches.

Attention has generally been focused upon the more spectacular happenings in the power station, but these were of secondary importance. The supplies could have been kept going to the part of Manhattan that suffered most by means of the interconnecting lines with the other stations, had enough distributor capacity been available where required to deal with local supplies from an alternative source.

The chief lesson to be learned is that the results of even a major disaster at a generating station may be much less than that due to a lack of adequate means for automatic sectionalisation of a distribution network in any given set of circumstances.

Progressive Management Imperative

As we hoped would be the case when we were writing our leading article of a fortnight ago ("Uncertainty or Expectation?") some of the functions held in connection with the Fair at Birmingham produced speeches which throw light upon matters of interest. Stress has been so frequently laid upon the importance of enterprising management of electricity undertakings that the subject is very far from new. How often has it been said that if every undertaking were fully alive to its opportunities, and properly shouldering its responsibilities, the number of consumers would increase with extraordinary rapidity! If we have heard less about it quite recently perhaps it has been because of the uncertain outlook regarding distribution. Assuming that little is to be done immediately regarding this question, the need for better management must still be hammered away

at in the hope that every indifferent engineer, council or company shall be made to understand that they are blocking the way to progress. Every undertaker should be induced to see to it that the financial status of those responsible for commercial development is raised to a worth-while figure, and no engineer should be so dog-in-the-manger content with his job as to stand in the way of somebody else more capable than himself taking the business side in hand. We have begun to make up the shortage of canvassers—how about those who should employ and encourage them?

Sir W. Ray's Resignation

THE work being done by the Electrical Development Association came under review in one speech, in which it was stated that the loss of the services of its Executive Chairman, due to illness, had been a handicap during a very busy year. It was intimated that the position in respect of this matter would be cleared up shortly. The official announcement of Sir William Ray's resignation followed in the course of a few days, and will be found in our "Personal" columns. It has, of course, been widely known that this question has occupied attention at Savoy Hill and elsewhere for many months. No doubt a further statement will be forthcoming during the next few weeks (the annual meeting takes place in London on March 20th). While we are not inside the charmed circle, we think, as close observers of the increased output of energy by a strengthened staff and the greater advertising and publicity activity, that the Executive Council will feel justified in taking a view regarding the filling of the vacant office which will differ from that which influenced it when it was making the first appointment after reorganisation. The electricity supply question, like many others, changes its aspect in the course of two or three years. The needs of the present may differ from those of the past, but nothing has happened to render a highly efficient development and publicity organisation less necessary.

Sharp Practice

AT a recent meeting of the London branch of the Electrical Contractors' Association a member reported that he had recommended a client to use three-pin plugs for radiators, but the local supply company had told him that two-pin plugs were good enough. On another occasion this contractor quoted against the supply company for some installation work, and his tender was found to be lower, and was accepted. The contractor thereupon asked the supply company for a connection. Before answering his application, the contractor says, the supply company presented his client with a lower tender for the installation work. This, we believe, is not entirely without precedent, but that is no excuse for such a flagrant lapse.

Empire Resources

SIR ROBERT HADFIELD, Bt., has written a book on Empire development in which he has advanced proposals for the establishment of an Empire Development Board. It contains the result of deliberations spread over a number of years, and was originally prepared for consideration by the Objects Committee of the Institution of Civil Engineers. The Council of that Institution in due course decided to urge the need for undertaking more energetic measures for the economic and technical development of overseas resources and to offer the advice and assistance of its members if steps in that direction should be taken. It is understood that a suitable memorial will be presented to the Government at an early date. Nobody knows better than the engineer and those who are associated with him what great opportunities are awaiting development in different parts of the Empire. Close upon twenty years ago a Royal Commission went most exhaustively into the subject, and those who studied its report at the time, as we did ourselves, were profoundly impressed with the potentialities. One of the Commission's recommendations was for the setting up of an Imperial Development Board, but Sir Robert says that the most important of all its findings, that "existing organisations are inadequate to deal with the scientific development of the resources of the Empire," is as true in 1936 as it was in 1917. Few matters are more important to us as an industrial people, needing work for innumerable idle hands and brains, and we commend the work to the attention of all our readers whether engineers or business men. The electrification movement at Home will gather impetus if we can concentrate also, both individually and on an organised basis, upon using electricity in the development of the Empire.

Lighting at Croydon

IN the course of his speech at the annual meeting of the Croydon Gas Co. the chairman bemoaned the loss of a local public-lighting contract. He is reported to have said, *inter alia*:—

"It is not fair to compare the improved lighting now given with the lighting previously given as a justification for this alteration, as we were prepared to afford a supply which would have given improved lighting with gas when the question was under review and prices were under discussion. *It is largely a question of the price and the amount of gas required*, the distance of lamps apart, and so on. If you put lamps nearer together people think you have a better light, so it is unreasonable to compare that lighting with lamps which are a long distance apart."

No doubt, in comparing tenders, the authority gave particular attention to the points referred to in the part of this statement which we have italicised.

A Gas Tribute

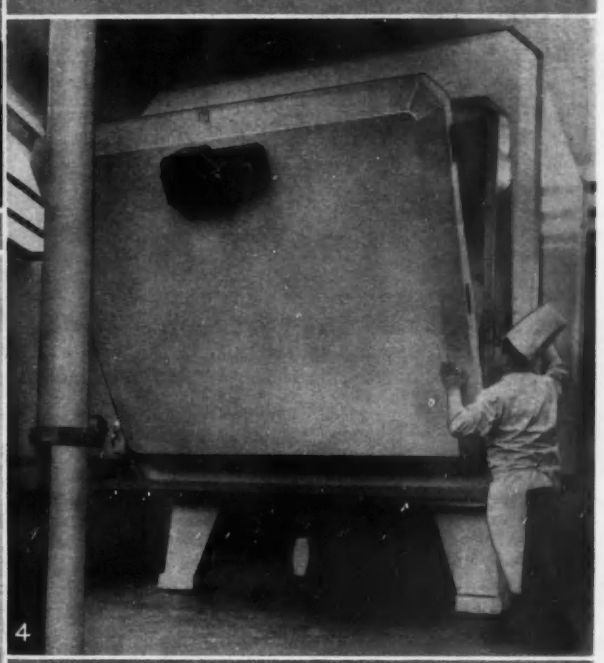
IT is frequently stated that electricity supply is not so vigorous and effective as that of our gas rivals. This is by no means general, however, as is evident from a statement by the chairman at the annual meeting of the Newport (Mon.) Gas Company. He deplored the continued fall in the sale of gas by the company (which had been going on for nine years), and said that the success of the electrical competition in the town was, no doubt, largely due to the energy of the company's competitors. Mr. A. Nichols Moore, the borough electrical engineer, should be highly flattered by this tribute from the enemy. A local paper dealing with the meeting, for some unaccountable reason, has headed its report: "Maintenance of the Sale of Gas: Year's Progress of Newport Company."

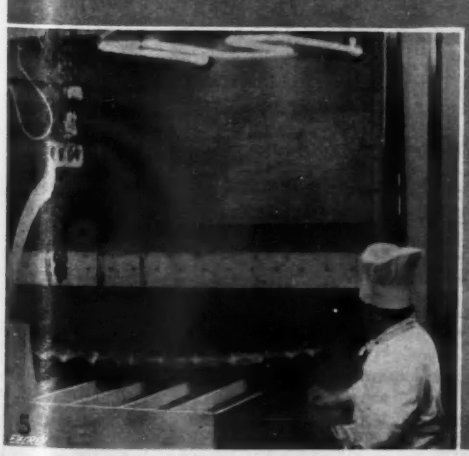
The Value of Space

ENGINEERING progress has been so much a matter of reducing weight and size for equal duty that the claims of the single-break oil switch to be regarded as an advance seem fully justified. As Messrs. D. R. Davies and C. H. Flurscheim stated in replying to the discussion on their I.E.E. paper, even if development charges prevented appreciable price reduction the space economised often has a very high monetary value. It may also be a deciding factor in the choice of any piece of apparatus. Head room may be more important than superficial area, but due regard is not always paid to this aspect when stating the advantages of compact structures, such as rectifiers.

Better in France?

SINCE the War rural electrification in France has been fostered by the State, and more than nine-tenths of the communes, containing half the population of the country, have an electricity supply. So far so good; but the extent to which the facilities are being made use of cannot be accepted as a model. The annual consumption per inhabitant varies in different districts from under 10 kWh to just over 20 kWh. The only comparable schemes in Great Britain are those at Bedford and Norwich, which were started five and six years ago. In the former area the consumption per inhabitant in 1933-34 was 127 kWh. and in the more recently developed Norwich area it was 54 kWh, both exclusive of motive power users. These figures, however, understate the position, in view of the rapid increase in consumers, all of whom were not taking energy for the whole year.





Electrical Propaganda Methods in Paris **(See next page)**

1. The Paris Distribution Company's stand at the Salon des Arts Ménagers. 2. A window at the OCEL (subsidiary appliance shop of the company) advertising water heating. 3. An electric cooker window at another branch establishment. 4. A giant cooker used for demonstration purposes. 5. A mammoth tart baked in this oven. 6. The tart being cut and distributed to the audience

Selling Electricity in Paris. By S. H. Kahn

Propaganda methods and appropriate charges

AN electricity supply company which is freed from the cares of generation is able to devote a great deal more attention to the *selling* of electricity—a matter which is a specialist job. The Compagnie Parisienne de Distribution d'Electricité is in this happy position and a study of its selling methods may be of interest to English electricity supply authorities.

Most of the company's activity has been concerned with domestic users, although the commercial and industrial business has not been forgotten. On the domestic side, the company has divided its publicity work into two classes; propaganda to promote the general use of electricity, and the development of electric cooking. The general propaganda is carried out through stands at fairs and salons where the public is given every kind of information of which it may be in need, with special emphasis on seasonable appliances. The daily Press, the cinema, posters and sandwichmen are also used to bring home electricity to the man in the street in an amusing way.

The headquarters of the Cie Parisienne de Distribution d'Electricité during a special electric cooking demonstration period

The idea of special propaganda for cooking is a relatively recent one and is most effective. A vacant shop is taken and turned into a kitchen and this is used for demonstrations and lectures on cooking. An example of the way in which this type of direct advertising is carried out is to be seen in the recent very amusing case of the giant tart which is illustrated on the preceding page. In this instance an electric oven 12 ft. high was installed and in it tarts about 5 ft. in diameter were cooked twice daily. Being brilliantly lighted and upon a busy street, the shop was visited by hundreds of people every day, between whom the tarts were divided. In smaller rooms at the rear complete menus were prepared, in apparatus of the normal size, and likewise given away.

All the information that might be desired was given, and the attention of the electricity consumers of the quarter was called to the shop by the branch office of the company. In this way the idea of better cooking by electricity in a country where better cooking is almost a religion, is being constantly drummed into the consumers, so that they can no longer fail to give electric cooking some serious thought. Just how serious that thought must have been is shown by the figures of the installation of electric cookers. In 1928 there were only forty-six such in the whole of Paris. By 1933 their number had risen to 5,736. In 1934 this figure was almost doubled, the total at the end of that year standing at 10,010, and by July 1st, 1935, it amounted to 14,674.

The cooking demonstrations are also used as an excuse to say a good word about electric water heaters which do not lend themselves so well to the striking demonstrations that can be devised for cooking. Here also results have been excellent, their number having risen from seventy-nine in 1927 to 9,337 in 1934.

Naturally the increase in the number of large electrical appliances has had its effect on the sales of electricity, but it is also worthy of note that the consumption per customer using this type of appliance has also been rising. Thus the average consumption per head was only 272 kWh in 1927, whereas in 1934 it reached 509 kWh.

But it is not only in trying to convince the customer himself that efforts are made; architects and estate agents are also approached with a view to persuading them to electrify whole buildings so that everything—lighting, heating, cooking, and air conditioning, is done electrically, no other means of doing these things being provided. The first figures for this sort of installation date from 1929, when there were fourteen buildings thus entirely electrified. By constant effort this figure was raised to 173 buildings by 1934, representing more than 3,700 individual customers with a total contract load of 13,500 kW and an annual consumption of well over five million kWh. Estate agents are also approached with the proposal that rising mains be installed in old buildings under their control. It is rather astonishing to discover that there are still buildings in a city of the importance of Paris which have no electrical installation, but the number of rising mains keeps increasing from year to year, and though the rate of increase is slackening the number still amounted to 2,875 in 1934.

This part of the business of selling electricity to the customer is only half of the problem, however. The customer must be persuaded wherever possible to use apparatus at times of low load. A good deal of progress has been made since 1926, when the first efforts in this direction were made. This has been largely due to the introduction of variable rates for energy which are based upon one of two principles—either to get the consumers to use electricity during a greater number of hours per year, and so to tend to decrease the difference between utilisation at times of peak and of low load, or to persuade them to use it only at times of low load.

Quaintly-attired sandwichmen distributing electric cooking leaflets in the Paris streets

The second solution has been found more particularly applicable to the domestic consumer who has a relatively large contract load. Here the meter is provided with three sets of dials which indicate the consumption at times which correspond to "peak," "day," and "night" rates. These rates are respectively 1.516 fr., 0.691 fr., and 0.227 fr. per kWh. Energy used between noon and one o'clock is thus obtained at a seventh of the price of that used between five and six in the evening. For the smaller domestic consumer this is not convenient. He is charged on a rate which varies with the number of hours of utilisation. The first 60 kWh per year per room are charged for at the rate of 1.551 fr., the following 30 kWh at 0.90 fr., and everything above 90 kWh per year per room at the rate of 0.258 fr. per kWh.

Similar principles are applied in the charges for shop-window lighting, signs and large commercial and industrial supplies.

Changing Over a Small Undertaking. By A. J. Dalton

The method adopted at Dorchester

THE value of a successful change-over from d.c. to a.c. in any undertaking must be measured in terms not only of technical efficiency, but also of those factors on which the future of the undertaking depends, which can be summed up as "the goodwill of the consumer." The observance of this point will considerably facilitate the work during the period of change and also the later development of the undertaking.

First, the engineer must visualise the completed change-over and then proceed to set up the necessary organisation, so that the work can be completed to schedule. The method adopted by the Dorchester Corporation Electricity Department, which has recently shut down its d.c. generating station on completion of conversion, was on the following lines. It was decided that (a) cable-laying should be done by contract; (b) sub-station connections, erection of feeder pillars, jointing, changing of consumers' apparatus (with certain exceptions) and changing of meters should be carried out by the undertaking's own staff; and (c) radio modifications should be put out to contract, in order that loan sets could be provided during conversion.

The following work proceeded concurrently:—Erection of the main sub-station; design and construction of an a.c. test room for testing and issuing all meters and keeping complete meter records; and the inspection and recording of *all* apparatus in consumers' premises. During the cable-laying and jointing the necessary three-phase wiring was being carried out and tenders were being obtained for motors, radio, &c. The main sub-station site was chosen because of its proximity to the centre of load, and because stores, workshops and showrooms could be accommodated on the same site. Moreover, it houses the C.E.B. step-down transformers which are switched on the 33-kV side at Winterbourne, five miles away; they are fitted with automatic on-load tap-changing gear, which maintains a constant predetermined voltage on the 11-kV bus-bars, permitting the sub-station to be left unattended except for manual adjustment of the regulator during peak periods. This arrangement will be possible only until the outlying portions of the new network become more fully loaded, when it is intented gradually to erect a series of sub-station kiosks fed by a 11-kV ring main.

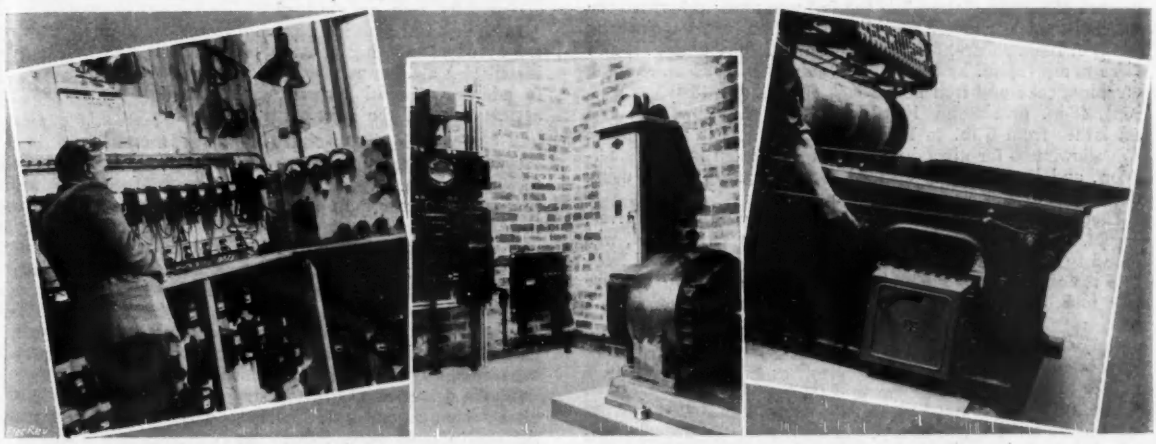
Energy is purchased from the C.E.B. at the undertaking's 11-kV bus-bars. Low-voltage distribution is standard four-wire and is carried out by English Electric open-type fuse gear. The 11-kV switchboard of B.T.H. "Q" type panels was the first of its type to be installed. The test room was designed primarily for single-phase testing, but a three-phase supply is available for other work. The establishment of this permanent feature at the outset of a.c. supply has proved most valuable.

The Record System

The return of the schedule cards sent out to each consumer with a copy of the statutory notice enabled preliminary estimates to be made for loan purposes. Later, each installation was inspected and complete records of every installation were entered on previously prepared cards filed in street order; all apparatus to be changed, including switches and plugs, was entered in black ink and the remaining apparatus, such as fires and universal appliances, was entered in red ink. After tenders had been accepted details of a.c. apparatus to be installed were also entered in red ink. All the red ink details are now being transferred to a new set of consumer record cards which will contain reasonably complete information of all apparatus on the network. This card also indicates by coloured tabs the tariff, the phase of service, whether hire-purchase or otherwise, the size and type of the meter, and the predetermined time at which the meter should normally be removed for overhaul. The reverse side of the card contains space for canvassers' reports and hire-purchase data. The close contact established with consumers during these inspections has since proved valuable, and the complete record obtained of apparatus installed has been almost essential to the economic distribution and balancing of load on the new four-wire network.

Voltage Regulation and Lighting

With regard to lighting, it was felt that an increase in the declared pressure from 220 V to 230 V was insufficient to justify the installation of new lamps, particularly as the actual d.c. voltage near the generating station was higher than the declared a.c. pressure. The effect has, on the whole, justified the decision; there have been no complaints of excessive burning out of lamps on the one hand or of poor light on the other, but it was to be expected that there would be complaints of increased consumption from districts where regulation was so bad on d.c. that at peak periods only 200 V was obtainable at the service fuses. The outcome has been a decided increase in the number of two-part tariff consumers.



A corner of the test room (left), the remote control sub-station which provides d.c. for a coaling crane (centre), and a push-button and rotor control built into a printing press

Makes and types of radio apparatus were analysed from the record cards; a schedule of types was issued, and tenders were invited for carrying out the change-over under the following headings:—(1) Battery eliminators (a) conversion by rectifier, (b) supplying new eliminator; (2) All mains radio; (a) conversion by rectifier, (b) rebuilding. The type of apparatus chosen embodied metal rectifiers, which have given practically trouble-free service once the "hum" difficulty had been overcome in certain instances. Consumers were given the choice of the above alternatives together with an option of taking compensation, the amount of which was the actual estimated cost to the undertaking of effecting a satisfactory conversion.

The percentage of wireless consumers to the total number was thirty-five, the proportion of each type being as follows:

	Percentage of total.	Average cost.
Battery eliminators	30.75	£1 10s. 5d.
Rectifiers (all types)	18.15	£2 4s. 0d.
Rebuilds	11.3	£6 19s. 2d.
Compensation	39.8	£3 9s. 8d.
Total	100.0	£3 3s. 3d.

On the whole, the change-over of eliminators has resulted in an increase of recorded consumption, due to the new a.c. meters possessing better starting characteristics than the d.c. meters, many of which would not record at all with an eliminator as load. Where rectifiers have been fitted, their losses accentuate the increase in consumption. The difficulty has been met by encouraging separate metering of wireless consumption at the heating rate of 2d. per kWh, or advising the adoption of the two-part tariff with a secondary charge of 0.75d. per kWh. This step has proved beneficial in that the cheaper kWh having been established, consumers are now beginning to purchase small domestic appliances. Particularly has this been noticed in the case of Council house tenants, from whom the majority of wireless complaints arose.

Except where impossible or unnecessary the following data

were obtained for every motor and its related machine :—Plant driven, nameplate speed, tested speed or speeds at various loads, nameplate horse-power, plant driven, starting current, full-load current, no-load current, motor pulley diameter, motor shaft diameter, torque necessary to move machine from standstill, and type of motor. To these were added details of costs of wiring and fixing. In exceptional cases other details were taken, such as centre heights of motors and positions of fixing bolt holes, but in general it was found more economical to buy standard motors and vary other details of the drive where possible.

The acquisition of the above data enabled a complete schedule of sizes, speeds and types of motors, together with pulley details and a brief specification of starter and control gear, to be issued to motor manufacturers. These were asked to state in their tenders guaranteed efficiencies and power factors, and the latter were taken into consideration before any tender was accepted.

Plant Modernisation

Every opportunity was given power consumers to modernise their driving systems while the change was taking place, and in five cases individual or group drive was adopted in place of a main driving motor which in each instance had been installed some years ago to replace a prime mover. In one of these works the plant consisted of the following machines driven by one 18-h.p. motor, but it was necessary to restrict the use of certain plant when the fan was used; otherwise the speed of the latter varied considerably :—Fan for 2-ton smelting furnace, 12-in. shears, 1-in. and 2-in. drilling machines, lift and force pump (2½ in. by 6 in.), 3-ft. foundry mill, 11-in. shaping machine, coke and iron hoist, hack saw, planer (3 ft. by 6 ft. bed), 48-in. grindstone, 10-in. and 18-in. emery wheels, and six lathes from 6 in. to 10 in. Exhaustive tests were made, due allowances for diversity of load being taken into consideration, and it was finally decided to adopt group drives using six motors of 2, 3, 4, 5, 6 and 10 h.p.

There was very little difficulty in arranging these drives, except that of the fan which, when tested by tachometer, was found to be running at 1,740 r.p.m. (the calculated speed from belt ratios was 2,700 r.p.m. !), but it was decided to increase this to 2,100. The efficiency of the fan was unknown, so a temporary vee-belt drive was fitted and the fan run on open outlet, the speed being tested, and current readings taken. This enabled the power to be calculated, and it was a simple matter to arrive at the horse-power required for the new speed, which has been obtained by using a 2,800-r.p.m. motor driving by vee belts and pulleys; this method has proved efficient, silent and reliable. The consumption for the December quarter of 1934 was 3,839 kWh, and for the corresponding quarter of 1935 it was 1,396 kWh. This result has, of course, had its psychological, and other, effects on the consumers.

Slip-ring induction motors have been used on printing machines where variable speeds are required with satisfactory results. There is a slight cushioning effect when any resistance is in the rotor circuit, due to the increase in slip when load is applied; thus, when using heavy formes, the motor slows up while the impression is being made. This tends to improve the quality of the impression and offers the possibility of increasing the overall output of the machine due to the increase in speed during the lighter load periods of the printing cycle, although the latter feature is governed to a great extent by the inertia of the flywheel and the moving parts as a whole. In carrying out these conversions care was taken not to overpower the machines, otherwise the full range of speed variation could not be obtained; also, the overload torque capacity of three-phase induction motors was made full use of in arriving at the required horse-power.

Supply to a Crane

Another type of installation dealt with was that of a 20-h.p. coaling crane, conversion of which would have necessitated the erection of 300 yd. of overhead line, 200 yd. of underground cable with underground plug boxes, the installation of a lighting transformer in the crane cab to avoid running a neutral, the complete dismantling of the crane to fit the new motor, and the fitting of a third contact ring and brushgear together with improved insulation to meet the increased voltage requirements. This work was estimated to cost at least £300, so consideration was given to the installation of either a mercury arc rectifier or a motor generator; the latter was cheaper but the losses would have been greater. The crane motor had a poor load factor which, taken into consideration with other items in equating the annual costs, proved the motor-generator to be cheaper by about £8 a year. The motor-generator is started and stopped by push-button near the crane, and the generator is slightly overcompounded to compensate for voltage drop in the consumer's line.

The majority of automatic refrigerator motors were found to be the d.c. equivalent of the 60-cycle a.c. motor of American origin. In the main, it was possible to fit standard 50-cycle motors with new pulleys and fans, the latter being necessary to maintain the correct amount of air blown across the cooling coils. In some cases, owing to special fixings, it was found necessary to fit a.c. motors of the original make. As regards this point, it is essential whenever there is a maintenance contract between the consumer and the makers to place the order for the a.c. conversion with the original makers. As a rule, prices will be found to be higher, but this cannot be avoided.

The method of handling the change-over of food preparing appliances was to obtain prices from (a) the original maker; (b) another manufacturer as a check against (a); and (c) a firm which specialises in rebuild conversions. Strict inquiries were made as to the success or otherwise of alternative (c), with the result that several conversions were carried out in this manner with complete success. Examples of the quotations obtained, making due allowance for the salvage value of the d.c. plant, show the possibilities of rebuilding d.c. machines of this type for a.c. supply.

	(a)	(b)	(c)
½ h.p. cake mixer	£18	£25	£12 10s.
1 h.p. meat chopper	£21	£35	£16 5s.
½ h.p. coffee mill	£13 5s.	£23	£9 5s.
½ h.p. coffee mill (another make) ...	£16	£16	£6 18s.

Care was taken not to cut across any form of maintenance contract in these conversions. Here, as with other classes of apparatus, compensation was offered to each consumer to enable him to modernise or enlarge his plant. This offer was accepted by forty per cent. of the consumers interested.

In the case of drawing office arc lamps, in order to maintain the speed of printing given by d.c. arcs, it was necessary to install 15-A a.c. lamps where 10-A lamps were used before and, in addition, special carbons were necessary to increase the actinic value of the light emitted.

Battery-charging Equipment

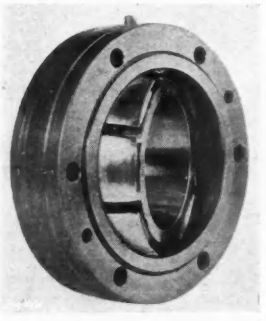
Generally speaking, valve-rectifier apparatus was installed for battery charging, although it was found necessary to put in motor-generators in some instances, which included the installation of a machine capable of maintaining stability at any voltage between 70 and 170. This necessitated an exciter for the main generator, which now enables the machine to cover an even greater range than called for in the specification. Some consumers preferred metal rectifiers to valves and were required to pay the difference in cost. With certain types of valve rectifier smoothing apparatus has been fitted to prevent interference with wireless reception.

Where it was necessary to carry out conversions of, or completely change, apparatus every opportunity was given consumers to meet their latest requirements, care being taken that displaced apparatus was not used again. In addition, assistance and advice were given in preparing extensions or alterations, thus enhancing the prestige of the undertaking.

My thanks are due to Mr. W. J. Smither, borough electrical engineer of Dorchester, for facilities kindly afforded by him in connection with the preparation of this article.

Tilting Block Bearings

A range of bearings, which is being introduced into Great Britain by Nomy Bearings, Ltd., 520, Grand Buildings, Trafalgar Square, London, W.C.2, is designed to have a carrying capacity independent of load direction when acting in a plane vertical to the shaft, to be unaffected by faulty mounting or shaft defects, to prevent (by its short axial length) the disturbing of the oil film due to flexure, and to ensure that the direction of the load is independent of the direction of rotation.



The "Nomy" bearing

The chief feature of the "Nomy" bearing is the rotating tilting block employed. In the type designed for radial loads, the blocks rotate together with the inner ring of the bearing, each block taking on its way a supply of oil from the bottom of the bearing. The spherical shape of the sliding surfaces prevents pressure on the edges due to oblique mounting or shaft deformation. Oil is continuously thrown between the blocks and the outer ring.

Support for each direction of rotation is afforded by ridges situated on the inner ring; as each block passes through an unloaded section of the bearing in one revolution, it is forced by friction against the outer ring to alter its supporting ridge. The axial direction of the blocks is secured by a flange which fits into a groove on the inner ring.

When used for fixed thrust bearings, since the outer ring is spherically shaped externally (enabling the bearing to move in its seating in the housing) axial displacement is prevented, and spring-operated plungers limit rolling movement.

Horizontal Discharge Lamps.

By R. Maxted, B.E.

How they have been developed

SINCE the introduction, over two years ago, of the principle of horizontal operation of high-pressure mercury-vapour lamps, extensive use has confirmed both the first expectations, based mainly on theoretical considerations, and also the earlier experience described in the ELECTRICAL REVIEW of July 27th, 1934. It is now safe to predict that horizontal operation will play a prominent part in street lighting and floodlighting wherever a high utilisation and an accurate control of the luminous output from a line source are requisite.

Nevertheless having regard to the geometrical form of the source (a cord approximately ¼ in. in diameter and 6 in. long) accurate control and high utilisation of the light output could not be so readily obtained as with the more compact source of the filament lamp.

In most modern lighting schemes the optical success depends equally upon two factors, namely, the direction and angle of incidence of the light projected at various points, and the provision of suitable intensities at these points. That is to say, the light proceeding in any one direction from a unit must be considered as a vector quantity and not merely as an unattached intensity. Especially is this so for street lighting and floodlighting, for which the light should proceed in certain desired directions and the intensities in all directions should bear a certain relationship one to another.

To realise these special distributions a very flexible control of the output from the source is required. From this aspect the greater controllability of the filament source might well have offset the threefold gain in efficiency of actual light production of the discharge lamp, in that the desired light distributions were obtainable in practice with the former and not with the latter. Furthermore, assuming that sufficient control of the long light source were obtained to give a desirable form of light distribution, would the quantity of light actually applied be sufficiently greater than that from a corresponding filament lamp to justify the resultant complications.

Experience has shown that, although many of the special fittings developed for the vertical discharge lamp give it a very definite advantage over the corresponding filament lamps in street lighting, yet the most successful fails to realise the same degree of utilisation and control of the luminous output as are obtained from fittings using filament lamps. The complete problem resolves itself into one of obtaining effective control of all the light flux, and with line sources the solution lies in an appreciation of the fact that, in many lighting problems requiring a special form of light distribution, a critical control of light flux is required mainly in one plane

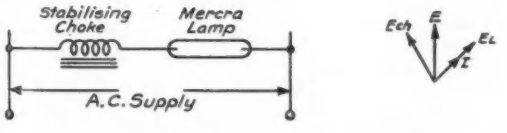


Fig. 1.—Circuit for a "Mazda Mercra" lamp

or in planes diverging only slightly from that plane. The obvious line of attack in the case of the line source is to arrange the source with the minimum dimensions in the plane of major redirection of light, *i.e.*, with the axis of the source perpendicular to the plane. In street lighting the plane is vertical and parallel to the axis of the road; in floodlighting the plane is also vertical and generally normal to the building face. The lamp must be arranged with the axis horizontal to realise accurate and complete control of the light output.

As explained in the earlier article, the difficulty of horizontal operation lay in preventing convection currents within the lamp from carrying the arc away from the axis of the lamp and forcing it against the upper glass wall, thus causing an early failure. This problem was attacked in the B.T.H. laboratories in a number of ways. The method first chosen for practical applications employed an externally produced magnetic field reacting upon the arc conductor, primarily because it employed lamps of standard design and construction.

A decision having been made upon the broader point that the means of horizontal operation shall be external to the lamp, there are a number of factors to consider in evolving a practical control unit. In the first place, complication to the user of the lighting unit incorporating the magnetic system must be avoided. This implies the necessity of achieving entirely automatic adjustment of the magnetic field strength to suit the starting and running characteristics of any lamp appropriate to the fitting. Furthermore, the control unit must be an integral part of the lantern, a non-replaceable item. Again, in order that the optical design of the fitting may have full scope, the magnets must be located at some distance from the lamp, while for electrical efficiency the consumption of the control circuit must be kept to a minimum.

In determining the manner in which the magnetic field must be automatically adjusted it is necessary to consider both the starting and the running conditions of the lamp. In fig. 1 is shown the electrical circuit of a "Mercra" lamp, which is operated from an a.c. supply and requires a stabilising choke. Upon switching on, an arc is first struck in argon gas at low pressure, and this discharge quickly vaporises some mercury, thus establishing a low-pressure mercury-vapour arc. The vaporisation of mercury continues until the stable running conditions of the high-pressure mercury arc are reached.

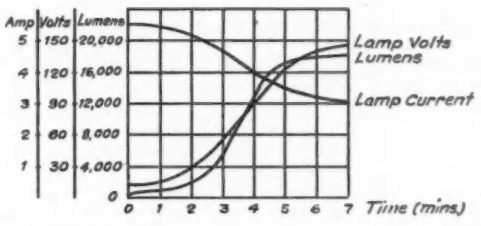


Fig. 2.—Starting characteristics of 400-W lamp and choke with average conditions for a 230-V, 50-cycle supply

As shown in fig. 2, the voltage drop at starting is of the order of 16 V, while the arc current for a 400-W lamp is about 5.5 A. This condition continues with little change for one and a half minutes, when the lamp current begins to fall rapidly, the lamp voltage at the same time increasing at a similar rate. Five to six minutes after switching on, stable running conditions are established and the lamp current has fallen to a value depending upon the rated voltage of the lamp.

The variation in final running current is due to the conditions necessary for stable operation of the lamp at various mains voltages. Thus, a lamp designed to operate on a 260-V supply can have an operating voltage drop of about 160 V, while to ensure satisfactory operation with a 200 V, a.c. supply, the operating lamp voltage drop should not exceed about 125 V. Hence, for a range of 400-W lamps to operate on mains voltages between 200 and 260, the operating currents will lie approximately between 3.6 and 2.6 A.

Assuming that the arc always acts, in regard to magnetic influence, as a normal conductor carrying an electric current and that the effect of convection currents is practically constant, the magnetic control should provide a field varying inversely with the lamp current. This is not strictly true, although for the present purposes the assumption is justified. Thus, immediately after striking, the lamp exhibits no formed arc, and a discernible cord of light does not appear until the lamp has been operating for about a minute. The formed arc does not react noticeably to a magnetic field for the first minute of operation; neither is it influenced by convection currents but lies along the axis of the lamp for about the first two minutes. The provision of the correctly compensated magnetic field therefore becomes of vital importance after about two minutes of operation. During the first minute the intensity of the field is unimportant, but during the second minute, while the field is not required, an excessive field acting in either direction will force the arc hard against the glass walls and may cause a fracture. Thereafter, the field must always vary inversely with the arc current, reaching a steady value suited to the particular lamp when running conditions are stabilised.

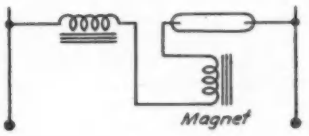


Fig. 3.—A simple series-connected magnet system

In the first attempt to operate the "Mercra" lamp horizontally by means of a magnetic field the simple series circuit shown in fig. 3 was employed. A design to hold the arc central under constant and predetermined current conditions

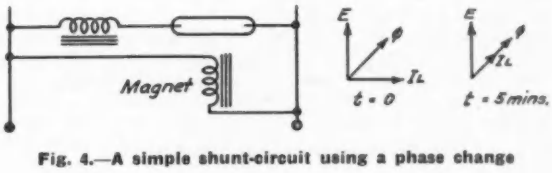


Fig. 4.—A simple shunt-circuit using a phase change

would necessitate either a closer selection of lamps than is normal in practice, or a manual adjustment of the magnet system by a skilled person whenever a lamp was replaced.

A far more serious drawback to the method is found under starting conditions. When the arc first responds normally to the magnetic field after the first minute of operation, the arc current and, therefore, the field strength, are considerably higher than under the stable running conditions for which the control must be designed. As a result, the arc is thrust down against the lower wall of the inner lamp and this sudden and intense local heating imposes a severe strain on the glass which might well account for many early lamp failures.

Some improvement in field control can be effected by connecting, in shunt with the magnet coil, a saturating reactor which will divert some of the excess current under starting

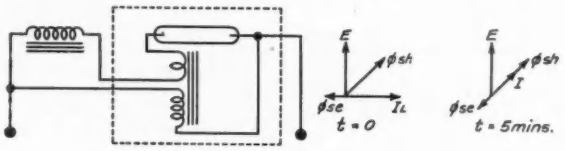


Fig. 5.—Circuit for compensated magnetic field

conditions. This modification increases both the cost and the power consumption of the control, while leaving the inherent disadvantage of a reverse compensation to that required to adapt the controlling field automatically to various lamps.

In fig. 4 is shown another simple circuit with which an attempt was made to provide adjustment of the magnetic effect by means of phase changes. The circuit constants were chosen so that the field was in closer phase to the arc current under normal operating conditions than during starting conditions when the arc current was a maximum. With this method, the choice lay between a high power consumption under normal operating conditions and deflection of the arc to the lower wall at starting, and no satisfactory compromise was forthcoming.

As a system is required that will vary the field inversely with the lamp current, the fig. 5 circuit was next developed. In this arrangement one solenoid is connected to the supply terminals and so arranged that the field produced depresses the arc. The series-connected solenoid is then introduced with the field opposing that of the shunt coil. The resultant field is a minimum at starting when the arc current is a maximum and then varies inversely with the arc current. Compensation for variation in supply voltage is also provided, for while the lamp current is increased by a rise in the supply voltage, the resultant magnetic field is decreased. Again, the shunt-connected coil provides automatic adjustment of the unit to different supply voltages, if the appropriate lamp is used.

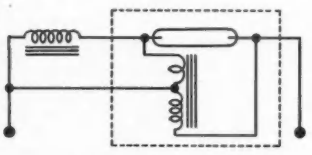


Fig. 6.—Modified circuit for compensated field

This circuit was the first to satisfy the essential magnetic conditions but had practical disadvantages. In the first place, the connections entirely within the lighting unit are those shown within the dotted lines, and an extra lead must be run from the lantern to the supply side of the stabilising choke. This means complication and added installation expense, especially where the choke is located at some distance from the lamp fitting. Furthermore, some complication of pole construction and of coil design is necessary in order to combine the two fields without linking the electrical circuits too closely. With too close a linkage the degree of compensation is reduced, and the power consumption is liable to become high.

Another method of applying the same principles is shown in fig. 6. Here the series coil is replaced by a shunt coil connected in parallel with the main stabilising choke, the high impedance of the shunt coil not materially affecting the function of the choke, but the practical difficulties remain.

The circuit of fig. 5 may be simplified for the user by the modification shown in fig. 7, in which the need for running

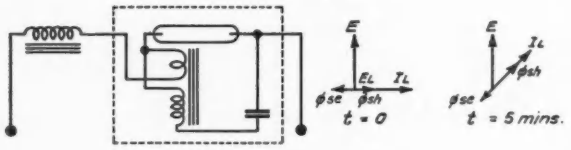


Fig. 7.—Improved compensated circuit

a lead to the supply side of the stabilising choke is avoided. The circuit is also inherently superior in that the field strength is determined solely by the lamp operating conditions, and is independent of the lamp stabilising circuit or the relative values of lamp and supply voltages. While the lamp is running up, the shunt field acts in a direction depressing the arc and increases proportionately with the lamp voltage drop. This field is opposed by the series field, which decreases proportionately with the arc current.

Thus, for any set of lamp starting conditions windings may be chosen which will give a wide range of the rate of change of the resultant magnetic flux with arc current throughout the starting period. Furthermore, the final value of the field can be varied while keeping a desired rate of change during starting. When the lamp has reached stable running conditions, the shunt field maintains a constant field determined solely by the lamp voltage drop, which is a constant for the lamp and is not influenced by change of arc current due to mains voltage variations.

The series field therefore compensates the resultant field for change in arc current due to poor regulation of the supply voltage. The circuit also provides automatic adjustment of the magnetic field to suit the characteristics of the lamp used, and in this feature it is not dependent upon the use of a lamp of the correct characteristics for the supply voltage available, as is the circuit of fig. 5.

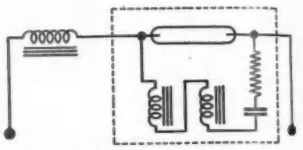


Fig. 8.—Simplified control circuit

An arc control using this circuit can be designed to satisfy the magnetic conditions and, in use, has provided entirely satisfactory operation of 400-W "Mazda Mercra" lamps ranging in voltage drop from 100 to 160 V. Thus, a 400-W fitting incorporating the control is applicable without adjustment of any kind to supplies ranging from 200 to 260 V, without complication to the user or the installer. One disadvantage remains, however, namely, that the satisfactory combining of the two component magnetic fields entails some complication in control construction with a resultant high initial cost. As in the case of the prototype, the construction can at present be simplified only with increase in power consumption.

The electrical circuit finally developed is given in fig. 8. It consists of two similar magnet coils in series with a small condenser and fixed resistance, the whole being connected in parallel with the lamp. The circuit constants are chosen to bring the magnetic field into a suitable phase relationship with the arc current, and the field is determined in magnitude by the arc voltage drop. The resistance limits the variation due to rise in resistance of the coils as these warm up.

Hence, a compensated field is provided as in fig. 7, the only difference being that the omission of the series coil eliminates the adjustment given by that circuit for poor supply voltage regulation. As in the previous arrangement, automatic accommodation is provided for lamps having voltage drops between 100 and 160 V, and a fitting using the control is applicable without adjustment to supply voltages ranging from 200 to 260 V, and without complication to the user.

For the past two years a large number of controls using the circuit of fig. 8 have been under continuous observation in the B.T.H. laboratories on lamp-life tests and in street lighting and floodlighting units. Since the magnetic control was first incorporated in commercial fittings in May, 1934, large numbers of 400-W horizontal fittings have gone into regular service on widely differing supply voltages. In every case, the standard control has been fitted and has proved to be entirely trouble-free.

Extensive laboratory tests have shown that with standard production controls designed to hold the arc central under running conditions in a 230-V lamp, the arc of a 260-V lamp is $\frac{1}{16}$ in. high and that of a 200-V lamp is $\frac{1}{16}$ in. low.

With an internal lamp diameter of $1\frac{1}{4}$ in., this variation in no way endangers the life of the lamp, and with an arc diameter of $\frac{1}{4}$ in. the effect upon optical results cannot be detected in a suitable lantern design.

Similarly, with variation of lamp watts due to irregularities in the supply voltage, in a 230-V 400-W "Mercra" lamp operating at 500 W, the arc is deflected 0.03 in. below the normal position and operating at 300 W, the arc rises 0.05 in. above normal. These are, of course, abnormal conditions.

Power consumed by the control unit is proportional to the arc voltage and lies between 3 W for a 200-V lamp and 5.2 W for a 260-V lamp. With a 230-V, 400-W lamp the average power consumption is 4 W, or one per cent. of the lamp watts. Expressed in terms of lamp efficiency, this consumption is equivalent to a reduction from 45 to 44.5 lumens per W, a negligible amount having regard to the gain in both the utilisation and control of the luminous output.

Automatic Cooker Control

Further opinions and some tests

THE article appearing in THE ELECTRICAL REVIEW of February 7th shows a deplorable diversity of opinion amongst those whose business it is to know what is required and indicates a confusion of mind which bodes ill for the future popularity of electric cooking. If the experts cannot give the public a clear lead the potential user will have none of them and their wares and will resort to other forms of cooker, using gas, oil or solid fuel. Either of these can now be obtained in types which are simple to work, easy to understand and give satisfaction.

What the Public Needs

By A. D. Constable

The processes of cooking, which determine the design of cooker, are now well understood. Reasonably rapid heating up is essential. A range of steady temperatures is necessary, as different articles require very different temperatures in order to get the best results. The old leisurely and extravagant methods of roasting joints by an open fire and baking in successive batches in a brick oven as its temperature falls are no longer available or desired.

For convenience in use every oven should have a dial marked in numbers applicable to the various articles to be cooked, by means of which the temperature can be regulated. When set it should then be possible to leave it to do the job, with little or no further attention. This is convenient even where there is a cook in constant attendance—an advantage not possessed by the majority of modern homes. In a very large number there is one maid who has many other duties to perform at the same time as the cooking is going on, or, probably, in still more cases, only the housewife who does not want to spend hours in the kitchen watching a meal cook.

The automatic control of modern gas cookers is an excellent selling point because of its real and easily demonstrable practical value. Electrical engineers should realise this and provide an electrical equivalent, although, unfortunately, the problem is less simple in the case of the electric cooker. Even the gas oven without this automatic control has the advantage of very fine control of the flames, which, with a moderate amount of experience, can be made full use of in regulating the temperature.

It is otherwise with the orthodox three-heat electric oven. Whilst the three heats give three fairly definite operating temperatures, these are seldom right for the whole period. They cannot be right for more than a few articles, and the temperature is, moreover, sensitive to variations of supply voltage. The degree of control is much too coarse and the cook has to juggle with the switches at intervals to get satisfactory results. Many people never learn how to do this effectively even if they can spend the time required in the kitchen, and many have tried electric cookers and discarded them for this reason, preferring to go back to gas with its finer control.

This is the automatically controlled cooker and equipment which the Lancashire Electric Power Co. provides under its 2s. a week all-in scheme mentioned in our issue of February 7th. Details of tests are given on the following page

To fit automatic thermostatic devices will naturally increase the cost of the cookers to some extent, but the additional cost will soon be paid for in savings on energy, and the loss of units consumed will soon be more than made up by the increased numbers of cookers certain to be required when a more convenient type is available.

With suitable simple instructions a thermostatic control device would readily be understood and intelligently used by all but a small minority, and this minority would not use anything intelligently, their results being a matter of chance in any case. Whilst there are reasonably good thermostat-controlled switches available, the best form for the purpose in question has probably not yet been produced. The ideal device must be practically foolproof, very robust and reliable when operated many thousands of times a week.

The method of setting should be by means of a clearly marked, easily visible dial used in conjunction with a conspicuous reference tally plate giving the settings required for the usual variety of articles to be cooked.

For simplicity, the oven should in all cases be switched full on and left so as long as the thermostat is working. The oven will then heat up rapidly and, when hot, the thermostat will take control. Provision of a higher rating to reduce the heating-up period is rendered easier if thermostatic control is fitted. The temperatures at which the circuit will be " made " and " broken " will diminish as the setting is altered to give lower operating temperatures.

An indirectly operated switch, not attached to the oven, will probably give the better service, the thermostat then merely actuating a relay circuit. Whilst failures of the automatic device should be of very rare occurrence with properly designed apparatus, it is desirable to make provision for some degree of temperature control by hand-worked switches.

So far, the control of the oven temperature only has been considered. Some form of control for the boiling plates is also required, but automatic thermostatic control in this case is more difficult, if not impracticable. Fortunately, it is not so necessary, as, in general, only one temperature is required, *viz.*, that of boiling water. If the heaters are correctly designed, and if the appropriate vessels are used, the heat required to keep them just boiling should be easily determined in the design stage.

It is well known that amongst very many people who have used electric cookers of the present types there is not only no enthusiasm for them, but positive dislike. This is undoubtedly mainly because of the need for so much attention if satisfactory results are to be obtained, owing to the customary absence of a reasonably fine degree of control and partly by reason of the comparatively long period required for initial heating.

What the "K & K" Co. Thinks

In the opinion of the Kensington and Knightsbridge Electric Lighting Co., Ltd., the additional expense of automatic control is not so great as would at first appear, since the cost of the thermostat can be offset against that of the three-heat switch and the thermometer, and maintenance costs will be reduced by the elimination of thermometer breakages. Close regulation of the thermostat is not of prime necessity, and a variation of 20 deg. would not be excessive.

Calibration by letters or arbitrary figures is undesirable, and definite temperatures should be stated on the control knob or dial. This would necessitate the design of a thermostat at least as accurate as the alternative thermometer, but would simplify for the cook the change from three-heat control to automatic. Any reduction in the heat insulation of the oven is to be deprecated, since, although temperature regulation would be improved, an increase in consumption would result. Higher oven loadings would be an improvement for the consumer, but would lead to increased voltage-drop troubles on the network and, in supply areas where the maximum demand coincides with the cooking load, would definitely be inadvisable.

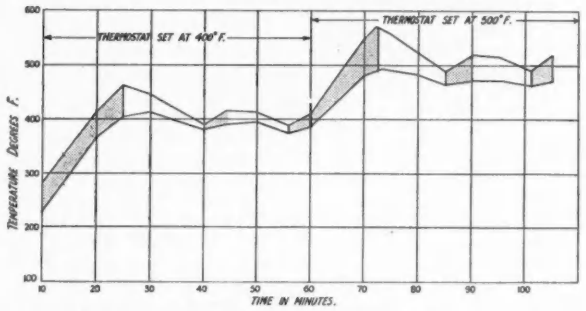
In the early stages of any scheme for the adoption of automatic oven control it should not be necessary to increase the hire charges, and the showroom staff should be relied upon to see that cookers fitted with three-heat oven control are kept in circulation. As a further precaution against the accumulation of a stock of second-hand three-heat control cookers the public demonstrations, which are a regular feature of most supply authorities, could be confined to cookers fitted with three-heat control. In supply areas where a change-over to a.c. is in progress the demand for thermostatically controlled cookers could be checked by offering them to a.c. consumers only. In the more advanced stages of the scheme the rentals of the earlier types of cookers which have already produced a large proportion of the required return could be reduced.

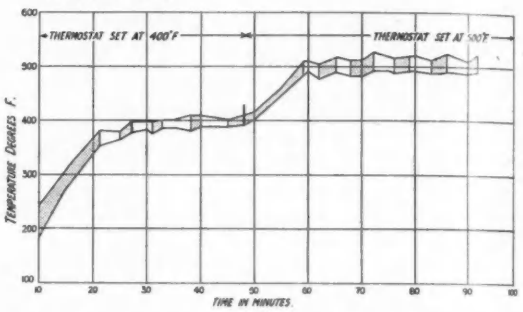
Cases have occurred where a consumer has definitely preferred three-heat control, but these are rare and it must be looked upon as inevitable that, at a not very distant date, thermostats will be fitted and supplied as standard, with the possible addition of a time-switch.

Tests by the Lancashire E.P. Co.

The accompanying curves show in marked manner the influence of the position of a thermostat in an oven on the results obtained and indicate the necessity of placing the thermostat in the correct position.

Actually the curves are plotted from test results obtained by the Lancashire Electric Power Company on a cooker produced by the English Electric Co., Ltd., and of the design adopted by the Power Company for its "all-in, 2s. per week scheme of cooker hiring and supply" (ELECTRICAL REVIEW, February 7th, page 208). The two lines represent the minimum and maximum limits of a number of plottings at each point, and the tinted areas represent "thermostat-on" times.





Left: Automatic oven temperature control test curves for "bad" and "good" thermostat positions. Right: The L.E.P. "all-in" cooker to which the automatic control tests apply

The left-hand curve shows the "on" and "off" switching periods and temperatures, attained for different thermostat settings with the thermostat in one position, and the right-hand curve shows the corresponding results for similar settings with the thermostat in the finally chosen position, 6¾ in. from the back and ¼ in. from the top of the oven.

There are two element sections at each side of the oven and two at the bottom. The oven space is 14 in. by 13½ in. by 15½ in., and the measured loading 2,350 W. The cooker measures 37¾ in. by 24¼ in. by 23¾ in. overall, and it has two hot-plates (1,600 W and 1,000 W) and a 1,800-W grill.

Readers' Views

We reproduce below the opinions of two readers upon the subject of automatic control:—

"A.M.I.E.E." says:—As one constantly in touch with a large number of cooker users I am of the opinion that automatic control is not a refinement, but is necessary and desirable on the following grounds:—

(1) The cook's forgetfulness and inability to maintain a constant temperature by hand control. It would establish our claim that the cook can leave the cooker to cook whilst she goes shopping, which is not true with hand control.
(2) It would deal effectively with the bugbear of pressure variation, particularly pressure drop. I have experienced a great deal of dissatisfaction and have known cookers to be discarded on this account.
(3) Automatic control must bring about more economical operation and would be of even more value if applied to boiling units to solve the simmering difficulty.
(4) It would facilitate higher loadings and more rapid heating, and what is more important, it would give infinitely variable temperature control and therefore much greater flexibility. The three-heat switch could be eliminated.
(5) It has a definite sales value. The gas industry has firmly implanted the idea in the public mind, and consumers will demand it.

Ovens will, of course, have to be properly designed for automatic control. Supply undertakings would be well advised to gradually convert existing cookers to automatic control. It would be a mistake to increase rents for automatic control; they are already too high as a rule.

Mrs. M. Eaton (E.A.W. Diploma) says:—From the cooking point of view I do not consider that automatic control offers any advantages. It may be a selling point, but satisfactory results can be, and are, obtained with the present three-heat switch control, which the consumers now accept as automatic.

I have discussed this point with many of the senior demonstrators in the industry, and we are agreed that a great advertising point is lost by the electrical industry on the lines that we do not need automatic control to correct electric pressure.

I should be interested to hear the opinions of other women on this matter.

The New York Edison Shut-down

THE trouble on the New York Edison system on January 15th started at 4.16 p.m., with an earth on one of the two independent sections of the 60-cycle 13-kV bus-bars at Hell Gate station between which the interconnectors from the Niagara-Hudson system and from the Sherman Creek, Waterside and Hudson Avenue stations of the New York Edison system were distributed. A 160,000-kW unit and a 40,000-kW unit were operating on one section, with the neutral of the generator of the h.p. element of the former solidly earthed and another 160,000-kW unit, with similar earthing; and a 35,000-kW frequency changer on the other section.

The force of the earth current, together with the flames, destroyed all evidence as to the cause of the fault, which was immediately communicated to the other section. The interconnectors and the frequency changer tripped out automatically, but the two 160,000-kW sets continued to feed earth current into the fault; and before the machines could be disconnected manually the neutral connections had burned off. Burning oil from the earthing switches damaged the neutral connections of two other 60-cycle generators.

In the meantime, before the trouble was cleared, a fault had developed on a different phase at another part of the second bus-bar that was isolated from the original fault by a storeroom and several fire walls, damaging the connections on a Niagara-Hudson and a Hudson Avenue tie.

The service to Westchester County was maintained by the Niagara-Hudson ties, to Queens from the Hudson Avenue station, and to about one-half of the Bronx and to Manhattan north of 129th Street, from Sherman Creek Station. This station and the connected distribution system were badly overloaded, causing a large voltage drop. The 60-cycle service to the Manhattan district between 59th Street and 129th Street, comprising about one-half the total load, was completely interrupted, but the remaining portion (a d.c. system) was unaffected. Service between the Battery and 59th Street was maintained from Hudson Avenue and Waterside.

The undamaged portions of the bus-bars at Hell Gate were promptly re-energised from the Niagara-Hudson system, and the Hudson Avenue and Waterside stations, thus restoring distribution feeders to service, which relieved the overload on Sherman Creek and provided normal service to the Bronx and Manhattan north of 129th Street except where overloaded transformers and secondary mains had been damaged. The above operations were completed in about one hour.

The few distribution feeders restored to Manhattan between 59th Street and 129th Street were seriously overloaded. Service was restored by sub-division of the secondary mains and successively re-energising the sub-divided areas by simultaneous replacement of transformer fuses, after opening some consumers' switches. Shortly after midnight, substantial service had been restored except in a few local areas where transformers and secondary mains had been damaged, and by 3 a.m. conditions in the district were generally normal.

A majority of the feeders from Hell Gate were energised by 10.30 p.m., and conditions were normal by 3 a.m. Repairs to the neutral connections were made, and the machines (which were undamaged) were restored to operation. The Hell Gate operators were hampered by numerous failures of the control and indication circuits caused by the fault current passing over them. High-voltage supply to the Independent Subway System was generally maintained, but the train signal system and auxiliary services, which are supplied from the distribution network, were interrupted and this resulted in a suspension of passenger service until 7.30 p.m.

Meetings and Discussions

Single-break Switchgear

kVA Rating Deprecated
Gas and Electric Heating
Indication and Supervisory Control

THE paper in which Messrs. D. R. DAVIES and C. H. FLURSCHEIM describe the development of "Metrovick" single-break oil circuit-breakers of metalclad design (to which reference was made last week) was discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 20th.

The opening speaker, Mr. H. A. Ratcliff (London Power Co.) said that his company had equipped two generating stations with 66-kV single-break switches and was now equipping two others. In congested areas and large cities 66-kV distribution might become obligatory in the future.

The conventional types of circuit-breaker were too large for installation in confined situations; they needed large and costly buildings, and the large quantity of oil which was required made the provision of adequate fire-fighting equipment costly.

The single-break switch had fulfilled the claims made for it, due largely to the manner in which the cross-jet pot functioned and the effective way in which contact was made with the moving part of the switch. The relatively small arc energy had no relation to the kVA rating and the sooner that rating was abandoned the better.

Mr. R. W. GREGORY said that if the single-break switch led to a reduction in price to the user then the authors would have achieved much. The cost of switchgear in general was too high. Under certain conditions a low kVA arc might be more difficult to extinguish than one of higher value. There was no reason why, for a given voltage, a highly rated switch should be dearer than one of lower capacity. One of the future essentials would be circuit-breaking at higher speeds, either by shorter breaks or quicker parting of contacts, the oil blast being imposed by outside pressure and not dependent on the arc itself.

The real friend of the c.-b. makers had been overhead lines. In these the lightning problem might be overcome by adopting railway practice, namely, using high speed circuit-breakers with reclosing features, and so simplifying and cheapening switchgear in general.

Mr. H. W. CLOTHIER said that four years ago he was apprehensive of "pots" in general, but improvements made since then had given him confidence in them. High-voltage switchgear was cheap when the amount of development work manufacturers were expected to do was taken into account. The right speed of "pot" operation was more vital than the number of "pots" used in series. Arcing times established by many tests showed that the shorter times were often obtained with switches of smaller power. If a 600-kVA switch involved a pressure of 90 lb. what would the pressure be at seven times that rating? Mr. Clothier said he admired the way in which the authors had passed the moving part through an oil joint, but they had done so at the expense of placing the "pot" upside down, in which position it would be liable to deterioration due to the accumulation of deposits. He admitted that a single "pot" was better than two, and with the aid of blackboard sketches suggested alternative ways of arranging the contacts so as to obtain short-time clearance with plain contacts. The authors should be given credit for originality, but he was not convinced that single breaking could not be done economically on conventional lines.

Mr. W. A. COATES pointed out that the British Standard Specification called for tests at full rating, but it was possible for the best performance to be obtained at some part of the range only. It was now appreciated that proofing tests must be made upward throughout the range. An agreed B.S.S. would shortly be circulated for consideration which would take such matters into account. The interpretation of two-part tests depended upon appreciation of their limitations. The three biggest testing stations in the world were in this country; even so 750,000 kVA was the limit. If the industry did not like synthetic tests, then it could have others, but the provision of larger testing stations would be costly.

Mr. H. TRENCHAM observed that in the gas-blast design the high value of compressed air as an insulator was overlooked and it was lost just where it was needed, *i.e.*, at the nozzles. Full knowledge of recovery voltage "shapes" would enable them to go further than the authors had implied. An instrument was now being tested which would show what striking voltage really was. He was not without hope of applying single break to low- as well as high-voltage gear, in a tank without joints at the bottom and perhaps with horizontally moving parts.

Mr. A. K. NUTTALL discussed the calibration of the potential divider used for the tests described in the paper, and the danger of leakage across the oscillograph deflection plates causing higher striking voltages to be indicated than in fact did occur. Tests had shown that high- and low-frequency calibrations were the same, so they might expect little likelihood of errors from that source.

Dr. W. B. WHITNEY said the paper contained valuable information which could not be obtained by others without great experience. The E.R.A. now had transportable apparatus ready to go out and make tests on systems so soon as supply authorities desired. A higher rate of rise of re-striking voltage might appear to be easier to break if the authors' method of interpretation were used.

Mr. C. H. FLURSCHEIM, in reply, said it would not have been possible to present the paper without the backing of the London Power Co. He agreed that "kVA rating" should be allowed to die a natural death, since no such thing existed and arc energy was not believed to indicate anything. If circuit-breaker design could be allowed to remain constant for some years then prices could be lowered. A new design should be justified on its engineering features, irrespective of whether it was cheaper or dearer.

* * *

A Comparison of Electricity and Gas for Heat Production

THE object of the paper which MR. A. H. BARKER read at the meeting of the INSTITUTION OF CIVIL ENGINEERS in London on February 18th was to give a general comparison of electricity and gas for heat production. The paper contained a mass of detail and, since the author has no direct interest in either the gas or electrical industries, he pleased neither side and was strongly criticised from both directions, particularly by the gas interests, which were represented in rather larger proportion (so far as speakers in the discussion were concerned) than electricity. In the author's own words, it was his endeavour to give the facts as they were and to eliminate expressions of his own opinions, although he stated that in doing so he found it difficult to make an intelligent comparison.

In addition to dealing with such questions as the first costs of power stations and gasworks, and also the cost of equipping buildings for either gas or electricity, the paper discussed the advantages and disadvantages of the two as regards cost to the consumer, ease of use and relative danger for such purposes as lighting, water-heating, space-heating of buildings, cooking, furnace work and welding.

The figures given relating to power station and gasworks costs were taken from data published in various year books. So far as they went, they appeared to show that the first cost of an electric power supply station was about three times that of a gasworks of equal heat output. On the other hand, a gas main generally cost from three to five times as much as the corresponding buried cable and from ten to twelve times as much as a suspended cable. An observation to the effect that the distribution cost of electricity was from one-fifth to one-tenth of the gas cost was, Mr. Barker stated, intended to apply only to the pipes and cables and not to the overall cost of distribution.

For equipping a building a good system of electric wiring cost from three to five times as much as an equivalent system of gas pipes.

The cost of production of electricity at the works was roughly 50 per cent. more than its equivalent of gas, and whereas the production of electric power resulted in the destruction of 75 or 80 per cent. of the total energy in the fuel, the corresponding figure for gas was 20 or 25 per cent. It was practically impossible for anyone to compare the average total cost per therm with the equivalent in electricity because the two industries were so large that an accountant's figure, even if produced, would have no particular significance.

The author's arguments were supported by many figures, tables and curves, and his general conclusion was that the cost of most heating operations was substantially lower by gas than by electricity at present prices. In most cases, owing to the absence of products of combustion and the non-material character of electric power, the latter was always cleaner and generally more convenient both to install and to use,

as well as being more efficient in use than gas. In some cases, especially where the character of the heat, the absence of products of combustion, and the small saving of labour and increase of convenience were not important, it was a waste of money to buy a high-grade type of heat for a low-grade purpose. Only where its superior convenience, cleanliness and control were of real importance, and the financial aspect was less important, could electricity be preferred to gas on grounds of economy. There were cases in which the ease with which electrical power could be switched on and off was of such value that that facility did, in fact, reduce the total annual cost of electricity for a particular service below that of gas for the same service. In the majority of cases in which heat was required, however, the difference between the amounts used was not great enough to justify the use of a more expensive fuel on economic grounds alone.

The auxiliary use of electric power for increasing the efficiency of combustion of gas and for removing the products of combustion could effect a material improvement in the efficiency of gas appliances, but the commercial hostility between the two industries was such at the present time that the use of auxiliary power in this way was not favoured by the gas industry. It would be of great advantage to both industries, added the author, and not less so to the public, if the two could be amalgamated.

Commenting upon a statement in the paper regarding the dangers attendant upon a breakdown of a large power station, MR. S. B. DONKIN remarked that the author had overlooked the C.E.B. interconnecting lines which aimed at giving an alternative supply in such cases. The reason for two-part tariffs was the inability to store electricity. Why had a London gas company introduced such a tariff?

After dealing in great detail with the figures of cost of electricity given in the paper and remarking that he could not make them square with the figures in the latest returns of the Electricity Commissioners, PROF. W. A. BONE expressed the view that there was no justification, except the necessity for getting a good load factor for power stations, for burning coal at a power station, sending it over a line for a mile or two and then converting it into heat at the other end.

That for the same initial coal consumption electricity had to be five times as effective as coal and two and a half times as effective as gas, was stated by DR. MARGARET FISHENDEN. On a cost comparison, the discrepancy was still greater between coal, gas and electricity. Taking coal at an average of 45s. per ton, gas at 9d. per therm and electricity at 1d. per kWh, gas cost five times as much as coal and electricity about fifteen times as much. The general impression created by Dr. Fishenden's remarks was that she preferred the coal fire from the points of view of better heat distribution and ventilation. The ventilation problem was also mentioned by MR. R. T. SMITH, who regretted that, with electric heating, the chimneys should be blocked up in existing buildings and excluded from new designs. He suggested some form of general heating with suitable ventilation, plus portable electric fires of 750 or 1,000 W.

Complaining of the prominence given in the paper to accidents and suicides due to gas, MR. S. LACEY (Gas Light & Coke Co.) pointed out that many more people were killed and injured by falling downstairs at home, and he said that if gas accidents were stated per million consumers instead of per million of population the figures for gas and electricity would be very close. The truth was that both electricity and gas were remarkably safe and that such accidents as did occur, apart from suicides, were due to badly designed and badly installed apparatus, to which both industries were doing their best to put a stop. He also challenged the figures of cost of gas in the paper. He told Mr. Donkin that the reason for two-part tariffs was not the inability to store either electricity or gas, but the need for covering overhead charges. For instance, the telephone two-part tariff had nothing to do with storage.

The fact that many large buildings in this country were heated entirely electrically was commented upon by MR. E. R. DOLBY, who inquired whether the installation at Messrs. Bourne & Hollingworth's in Oxford Street, where the heating was effected by means of air warmed by electricity and delivered into the building by fans on the roof, was giving satisfaction technically and financially.

MR. J. I. BERNARD (Electrical Development Association) regretted the absence of practical equivalents in the paper as set off against the academic or theoretical comparison of heating costs based on the potential heating values of gas and electricity. With regard to cooking, for example, the conclusion was that electricity at 0.7d. per kWh was equivalent to gas at 10d. per therm, but in the table of figures the prices ranged from 0.51d. to 0.6d. A very much higher grade of coal was used for making gas than electricity, and from the point of view of coal conservation the gas industry was using five times as much coal as the electricity industry for lighting purposes, and was therefore exhausting the coal supplies of the country much more quickly. He said that the paper was too optimistic with regard to gas and pessimistic as to electricity. Apparently the author was not fully aware of the extent to which the cost of electricity had been reduced in recent years. For instance, for domestic purposes it had been reduced by more than 50 per cent. in the last ten years and the large majority of people could now obtain electricity for heating and cooking at ¾d. per kWh, at which price it was as cheap as gas at 10d. per therm.

The rapid advances being made with electricity and its applications were referred to by LORD PENTLAND, who suggested that, even if the author's figures and conclusions were correct to-day, they would be modified considerably in a very short time. He also suggested that the effect of an increase in the cost of coal would be more serious for the gas industry than for the electrical industry.

The figure of 20 to 25 per cent. given as the thermal efficiency of large power stations was challenged by MR. R. GRIERSON, who said that Barking and several other base load stations were operating at 28½ per cent., while better figures would be obtained shortly.

In the course of a long and detailed criticism of the paper, MR. C. A. MASTERMAN (Gas Light & Coke Co.) said the estimate that 0.7d. per kWh for electricity was equivalent to 10d. per therm for gas for cooking was about 50 per cent. in error. He suggested that the author had not made himself familiar with the developments in gas cooking during the last few years, or had exaggerated to this extent what he imagined to be the developments in electric cookers. As this paper had been read before such an important body as the Institution of Civil Engineers, it seemed to him necessary to draw attention to an undue number of apparent inaccuracies in it and to the possibility of the paper creating false impressions which would be detrimental to the two great industries involved.

Owing to lack of time the author was unable to reply at the meeting, but promised to do so in writing.

* * *

The Remote Control of Power Stations

In a paper by Messrs. G. A. BURNS and T. R. RAYNER read before the Meter and Instrument Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London recently, attention was drawn to the fact that the use of centralised indicator equipment has become essential for the economical operation of power distribution networks. The authors deal with centralised indication and supervisory control methods, the various facilities usually demanded in practice being outlined. The choice of method and type of signalling channel to be used are discussed, and the need for adequate protection of the signalling channel and equipment against possible high induced voltages is emphasised. The Strowger automatic telephone apparatus employed for various schemes of remote supervision and control is described, together with relay characteristics and operational features of selector switches and typical circuits. The layout of certain control rooms of the British grid is given. The authors also deal with various methods of remote metering, including individual selections, spot readings and photo-telemetering, as well as a system of engine-room telegraph signals. A method of protecting power networks over the signalling circuits by means of automatic telephone apparatus, is explained. The system is said to be characterised by extreme rapidity of operation; to have automatic self-checking features; and to be adaptable to the inter-tripping of circuit-breakers.

There are already in service on various sections of the grid in Great Britain approximately 150 installations of the type of apparatus described, embodying automatic telephone apparatus. The apparatus is claimed to be practically inexhaustible in its flexibility of application and to have the advantages of economy as regards the signalling channel and reliability in service. It is mentioned that the apparatus components employed are the same as those incorporated in approximately eleven million lines of automatic telephones in practically every country of the world.

* * *

Electricity and the Farmer

In a paper on this subject by MR. A. L. CAIN, which was read before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on February 21st, satisfaction is expressed at the knowledge that farmers are at last placing confidence in electrical machinery for use on the farm. There are, however, still large numbers of tractors in use where electricity is available, and as these machines represent a big proportion of the power used they must be supplanted by electrical machinery if the farm is to become "all electric."

Electricity has been largely responsible for the rapid growth of poultry farming during recent years, but there are still many farming applications awaiting the investigation of the electrical engineer. Personal contact between farmer and supply authorities is essential.

* * *

Coal and Stone Boring

At a meeting of the West of Scotland branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS in Glasgow on February 12th, MR. H. MITCHELL read a paper on "Coal and Stone Boring," in which he described modern types of electric drilling units, comprising a flameproof panel and drilling machine, cable, plug socket, drill rods and "Wimet" tipped drilling bits. The features of a panel only 19 in. in height, including skid mounting, were illustrated by lantern slides. The author instanced a case where an electrical machine performed in a little under two hours work that would take thirteen hours by hand. From the power saving point of view, Mr. Mitchell quoted figures obtained from a very large colliery group which had replaced compressed air by electric drilling. The figures showed that when using compressed air machines 900,000 kWh was consumed per annum, whereas with electric machines only 45,000 kWh was consumed. Thus, at ½d. per kWh, the cost per annum for compressed air was £1,875 and for electricity £94.

* * *

Road Brightness

The latest investigations which have been made into the possibilities of utilising the reflection characteristics of road surfaces in conjunction with the distribution of the light from street lamps in such a way as to create a uniform and high road brightness was discussed by MR. C. C. PATERSON, of the G.E.C. research laboratories, in a lecture on "Modern Street Lighting" which he gave at the Heriot-Watt College, Edinburgh, on February 19th. Mr. Paterson explained how visibility and consequent freedom from road accidents depended upon a high road brightness in order to ensure the best contrast between objects and their backgrounds.

"Blind" Landing for Aircraft

The Lorenz radio beacon system

A PRACTICAL demonstration of the Lorenz "blind approach" system for enabling aircraft to land safely when visibility is bad due to fog or low-lying clouds was successfully carried out last week at Heston Aerodrome (West London) by Standard Telephones & Cables, Ltd. By means of the medium-wave radio direction-finding gear which is now available at major airports the pilot is guided to within 20 miles of his destination. He thus comes within the range of the main transmitting beacon of the "blind approach" system.

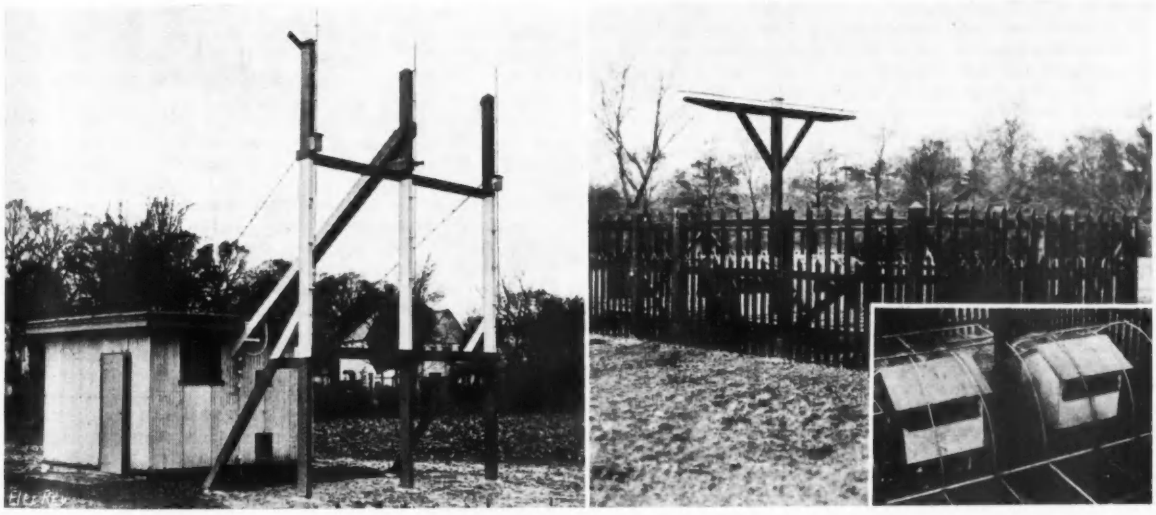
This 500-W beacon operates on a wavelength of 9 metres and has an aerial system of three short vertical wires (the outer two being relay-operated) so arranged as to send out continuously a series of Morse dots on one side of the true course and on the other side a series of dashes. These two beam signals gradually merge together, so that when the aeroplane is on its true course the pilot hears a continuous signal in his earphones. In addition to this aural guidance alternative visual indication is provided by a luminous instrument mounted on the control board of the machine. While keeping to the true course a vertical indicator needle remains central on the scale, but deviation to one side or other causes a deflection, showing the pilot in which direction he is erring.

To enable the pilot to determine accurately his distance from the landing ground two small "marker" beacons have been installed, one about two miles outward and the second on the boundary of the airport. These "markers" operate on 7.9 metres and send out vertical signals, each having a distinctive tone, from short horizontal aerials.

Flying along the main beam towards the main beacon at the far end of the aerodrome, when the machine reaches the first "marker" beacon one of two neon lamps on the pilot's dashboard instrument glows, a corresponding high-tone signal being heard in the earphones at the same time. On reaching the inner "marker" beacon the second indicator lamp glows and a signal of a lower tone is heard in the headphones.

In addition to course guidance, the Lorenz system also assists the pilot to assume an appropriate gliding angle for landing. As soon as the aeroplane comes into the range of the main transmitter beacon beam a horizontal needle in the dashboard indicator will gradually move up a graduated scale as the airport is approached. The pilot then adjusts his altitude so that, when he reaches the first "marker" beacon, the machine is at a height of approximately 600 ft.

As the first warning lamp glows the pilot notes the position of the indicating needle and so controls his machine that the reading of the indicator remains steady. This action will ensure that the aeroplane will descend along a gentle glide path so that, when the second lamp glows, the machine's height will be about 60 ft. Having thus reached the boundary of the aerodrome on the correct path, the pilot can complete the landing from this height without difficulty.

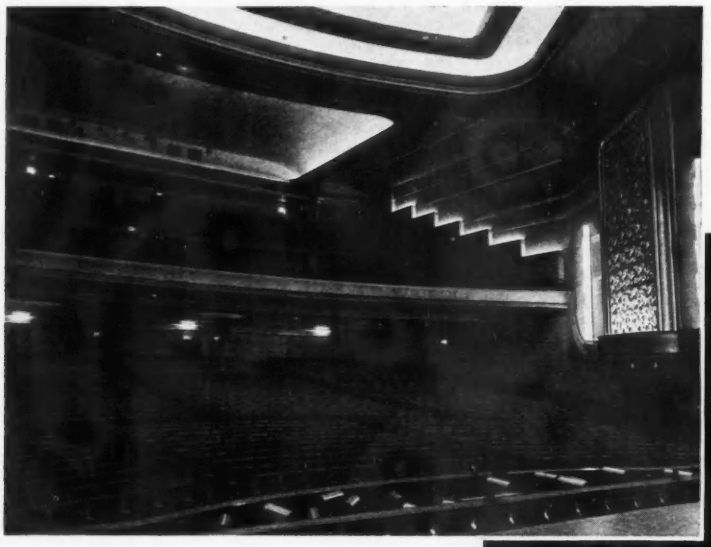


Left: The main transmitter beacon. Right: A "marker" beacon aerial and enclosure. Inset: Cubicles for "marker" beacon with screening net

Regular communication between the pilot and the airport control officer takes place on medium wavelengths, so that, by using the visual indicator of the Lorenz system, the pilot can retain the landing facilities and, at the same time, receive or transmit important information even up to the moment of touching the ground.

The three ground beacons function automatically and are remotely controlled by the airport officer, who is provided with full supervisory signals.

For last week's demonstration a three-engined "Junkers 52" monoplane, which is engaged in the regular Berlin-Amsterdam-Croydon passenger service, was lent by the Deutsche Luft Hansa A.G. No British aircraft (apart from a "Standard" demonstration two-seater monoplane) has yet been fitted with receiving equipment for landing according to the Lorenz "blind" system, which was first installed at Berlin (Tempelhof Aerodrome) in 1932. Since then the system has been put into operation at Hanover, Cologne, Frankfurt, Vienna, Hamburg, Nüremburg, Stuttgart, and Leipzig, while an installation is nearing completion at Le Bourget, in France. The equipment at Heston is the first of its kind in this country.



Up-to-date Cinema Equipment

The electrical installation at a new London theatre

LONDON'S new 3,000-seater Paramount cinema which has just been opened on the site of Messrs. Shoolbred's emporium in Tottenham Court Road, London, embodies several interesting innovations in electrical stage and auditorium technique. The electrical equipment has a total load of no less than 260 kW and the estimated maximum demand is 180-200 kW, this high figure being due mainly to a 300-A load due to the neon lighting.

A 400-230-V, 3-phase, 50-cycle, a.c., 4-wire supply is received from the St. Pancras Electricity Department from a sub-station under the theatre and is controlled by a Drake & Gorham main switchboard in the front-of-house intake chamber, subsidiary control being obtained by means of "Desco" lighting and power distribution boards. For safety a 50-V supply is used for the gangway lighting.

To overcome the difficulty of obtaining the maximum demand for the whole building a Landis & Gyr combination watt-hour and maximum-demand meter has been installed in the stage intake chamber with a set of current transformers with interconnected secondaries.

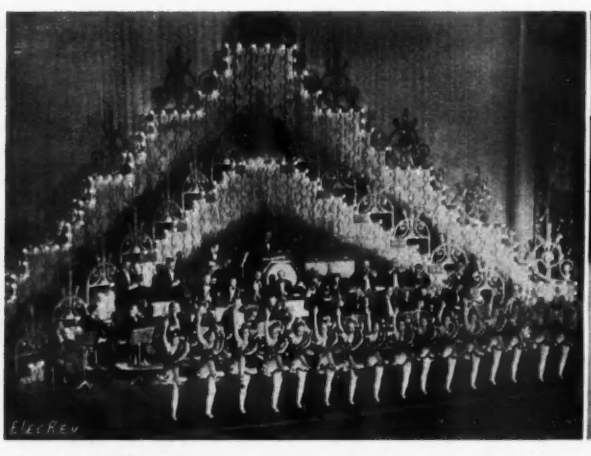
The stage-lighting equipment, which includes four battens and footlights (Strand Electric) and six three-colour stage dips, is controlled by a Major Equipment Co.'s three-colour board with individual colour master and grand colour master control. The colour master switching is controlled by contactors. All the stage motors for the screen and fire curtains and the Compton organ were supplied by Messrs. Knight & Co. (Engineers), Ltd. The fire curtain, which weighs seven tons, is operated by a 3-h.p. motor with an oil buffer. Incidentally for the screen itself, instead of linen, perforated rubber studded with very fine glass pellets is used.

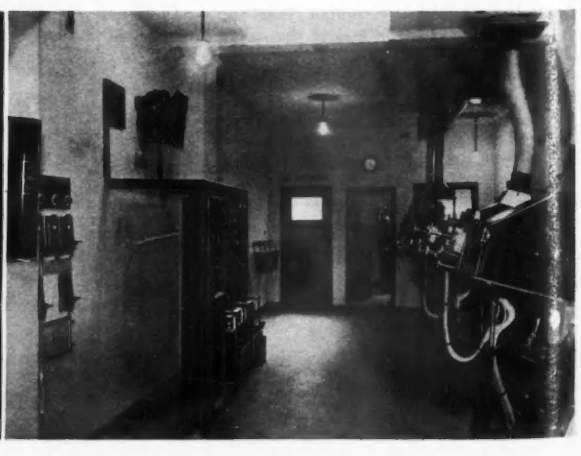
To provide the direct current necessary for the two projectors and the four spotlights, two 20-kW E.C.C. mercury-arc rectifiers have been installed in a small room adjoining the projecting room.

The rectified current is then taken to a contactor board, this being employed in order to keep the heavy load out of the projecting room. An emergency lighting supply from 180-Ah Chloride accumulators operates in parallel with an oxide cathode rectifier.

The sound-reproducing equipment is claimed to be absolutely foolproof, all parts being duplicated. This is the first occasion upon which the Western Electric Co. has installed a completely all-mains apparatus in a Paramount cinema in this country. Special non-synchronous equipment is used and the compact sound switchboard handles not only the sound track reproduction but also music from a two-turntable gramophone pick-up and stage microphones, as well as the organ balance microphones. A volume control panel is situated at the back of the circle. The employment of a fibrous non-resonant material in the composition of the walls eliminates echo and assures uniformity of sound.

The attractive appearance of the auditorium is due in no small measure to the soft lighting derived from pink-sprayed lamps hidden from sight in cornice recesses in the ceiling and under the circle, the surfaces of the walls and ceilings themselves being of golden pink colour. Cornice lighting is also to be seen to good advantage in the corridor behind the circle and in all cases metal wing troughs with porcelain sign-type holders are used supplied by the Major Equipment Co., Ltd. This company's spun copper reflectors, which are also employed extensively throughout the installation, are particularly suitable for fixing in awkward positions since they embody specially designed slip-rings which enable them to be fixed





Left: A reproduction of a photograph of the Tiller Girls taken by means of the ordinary stage lighting. Right: The projector room with the sound control panel on the left

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

The Load Factor Fetish

With much of your editorial note bearing this title in your issue of February 14th I agree, but is it the case that "the effect of load factor, even on distribution costs, which are practically all standing charges, may not be material"?

Surely it is better for everyone concerned that 100 per cent. use should be made of the capital expenditure on both generation and particularly distribution than that only about 20 per cent. use is made of it. This is probably a reasonable estimate of the present use for domestic supplies and largely accounts for the inability of many supply undertakings to offer prices sufficiently low to compete with their rivals for the cooking and heating business. W. L. SHAND.

Guildford, *February 19th.*

What Might Have Been

As an old-timer dating from the days of Q. and I. detectors when the "current of 100 daniells" might mean amperes and might mean volts, for which no names had yet come into general use, I think that it might interest the curious to know of a letter of Latimer Clark and Charles Bright, dated September, 1861, in which they proposed that the "tension of 1 daniell" should be called "1 ohma," and that the quantity of electricity spread over one square metre of a plate situated at one millimetre from another plate of the same size, at a tension of 1 ohma, should be known as 1 farad. One farad per second should be one galvat, while the resistance of 1 volt was to be that which opposed the passage of 1 farad driven by a pressure of 1 ohma.

If this nomenclature had been accepted we should be now talking of a 66,000-ohma transmission line carrying 20,000 kilo-ohma-galvats of energy (kOG instead of kVA).

Watford, *February 19th.* EDWARD C. BARTON.

Link Disconnecting Box Operation

At a recent reading of a most instructive paper by Messrs. A. M. Pooley, M.B.E., and H. Simmonds, the possible bad effect of arcing when withdrawing or replacing bridges in network boxes under load conditions was raised. I feel, therefore, that the following notes on procedure will be of interest to your readers. This procedure is based on several years' experience of network operation using boxes for feeding open cables, ring cables, and sub-station paralleling cables up to 0.3 sq. in. section and in connection with sub-stations of up to 800 kVA capacity.

Links, fused or solid, may be divided into two classes, namely (*a*) spring contact type, and (*b*) grip contact type. Both of these usually have locking devices. For operation (*a*) should have the locking device loosened and (*b*) should have the locking device slackened only. Both should be withdrawn with a sharp but even upward motion, keeping the link parallel to its seat. Both should be inserted by engaging one end first using this as a fulcrum to obtain quick positive contact with the other end. These precautions ensure that the major arc occurs on a portion of the link not used when the link is right home.

It is a distinct advantage to have all exposed metal on links and pillars and including contact surfaces covered with a thin smear of pure vaseline. This is especially advantageous on bare copper, brass or bronze contacts and surfaces. There is a possible modification of design in some links which would avoid every risk of bad contact from arcing, but details of this would not be relevant here.

H. G. BATSON, *Associate I.E.E.*

Birmingham *February 23rd.*

It Had no Father!

It has been wondered why at the annual dinner of the I.E.E. the President chose to describe the Society of Telegraph Engineers as the *father* of the Institution, unless he is in the habit of regarding the child as father to the man. "By the natural law of paternity" he claimed the Postmaster-General as "our grandfather." He did not advise us what we should go and tell our grandmother!

Now if anybody ought to know that the Society of Telegraph Engineers was founded in 1871; that in 1881 it became the Society of Telegraph Engineers and Electricians; and that in 1883 the present title, Institution of Electrical Engineers, was adopted—surely it is its President! B. H. A.

February 25th.

"More Plug Points"

"C.P.'s" letter in the February 21st issue of the ELECTRICAL REVIEW is interesting and no doubt typical of the point of view of many diehard electrical men. That I am aware of the points raised should be clear from my last paragraph. However, in the example quoted the large radiogram was fitted with the same size and quality flex as supplied with 230-V 3-kW fires and the set itself carried two 5-A cartridge fuses. The iron, too, was fitted with a heavy and good quality non-kink flex, and I claim that with first-class flex and accessories a certain latitude is permissible. In any case fused 5-A plugs and 15-A to 5-A plug tops can be used if desired.

Referring to "C.P.'s" concluding remarks, may I draw his attention to the "Wylex P.W. All-in System," a well-thought-out arrangement of plugs and sockets giving practically every desired combination of outlets from one 15-A point.

February 24th. SALESMAN.

Will "C.P." please state which I.E.E. Regulation stipulates "that no appliance taking under 15 amperes shall be connected to a 15-ampere plug." H. BAKER.

Twyford, Hants, *February 24th.*

Teaching Electrical Engineering

While appreciating the remarks of your correspondent "Keep Up to Date" under this heading in your February 21st issue, I should like to point out certain advantages in the use of older apparatus in the training of engineering students, of whom I am one.

I find that the open, solidly built, and liberally designed machine of the past, with its ability to stand any amount of punishment electrically and mechanically, is of more value to myself as a means of illustrating fundamental principles than its modern counterpart whose internal economy is not visible at once and which is less adaptable and often extremely temperamental. For these and other reasons I do not consider that the use of modern apparatus becomes important until the final stages of a course are reached.

I can think of only three advances in the past ten years which are likely to have any great effect upon the average student. These are the development of non-rotary convertors, commutator motors, and cathode-ray apparatus.

JOHN STOTT, *Student I.E.E.*

Manchester, *February 24th.*

Meter Vagaries

A short time ago, at a provincial I.E.E. informal meeting, in contributing to the discussion I mentioned that a certain fault had caused the meters in some houses to run backwards. The remark was quite incidental and serious but at once there was a loud outburst of laughter and clapping. Perhaps the phenomenon is hardly one to appeal to grave meter engineers: it is one, however, that evokes in other folk only the kind of excitement that follows an under-assessment by the Inland Revenue authorities.

Up-to-date Cinema Equipment (*Continued from preceding page*)

with one hand. Additional auditorium lighting comes from four fittings under the circle and from a pair of novel pillar-type fittings, composed of a number of cubical and cheese-shaped sections, on each side of the stage. These fittings, as well as many other fittings throughout the building, have been made by Messrs. Best & Lloyd, Ltd., to the design of the architects, Messrs. F. Verity and S. Beverley. In the auditorium there is altogether a lighting load of 80 kW. In the circle gangway lights have been installed on the side of the seats.

For the exterior neon lighting on the underside of the canopy Claude-General Neon Lights, Ltd., have erected a series of green and red ribs alongside each other, producing an almost white light. The display signs were carried out by Boro' Signs, Ltd.

The air in the building is kept pure and at a comfortable temperature by means of a plenum system of air-conditioning carried out by the Carrier Engineering Co., Ltd. For the sake of economy the warmed air is recirculated after being thoroughly washed.

A Sturtevant vacuum cleaning plant, a Smith electric clock system and Standard automatic telephone system are other electrical features of the cinema. The electrical installation was carried out by the Berkeley Electrical Engineering Co., Ltd., which has employed B.I. cables and "Mazda" lamps throughout.

Meters, for one reason or another, may run backwards—and they are not necessarily neglecting their duty. Not many consumers are interested in their meters, but among those who *do* watch them I have not found any who, knowing a meter to be running backwards wrongly, have not reported the fact—perhaps after a little justifiable delay! I recall in particular a man who telephoned to say that "the wires have got crossed and the meter is ganning back ower."

But there is scant time-lag in complaining that the meter is going forwards too enthusiastically! The meter nearly always "says we have used several times more than we have." Mains-driven radio sets are useful energy users of good load factor, but how many consumers at first realised that their steady consumption would matter? And the attic lights left burning for months!

When a meter's accuracy is in question one may be faced with two most positive statements. There is the meter engineer's; and in this, by more or less elaborate means, the integrity of the offended meter is demonstrated in as absolute terms as possible. Then there is the complainant's solemn affirmation: in the last quarter there have been fewer people living in the house; two rooms closed; the family away for three weeks; a full-time maid replaced by a morning girl; radio set used less than ever—owing to the shocking programmes recently—but it doesn't *use* any electricity, anyway; and so forth. Each authority very assured and very dogmatic, you see!

Then there was the sad case of a colleague in whose house a meter was newly fixed. After a week he found that it read 1,500 and assumed (wrongly) that it had started from zero. To this day he regards the meter superintendent with a baleful and suspicious eye, for that worthy solemnly apologised profusely for neglecting to fit the meter's braking magnets and for giving the register a constant which was ten times too big!

STAN DARD.

February 18th.

Electrical Visitors to the Fair

Points from speeches

SPEAKING on the occasion of the official visit to the Fair of the Birmingham and District Branch of the Electrical Association for Women on Thursday, last week, the Dowager Lady Swaythling commented on recent activities of the Association, and said that the E.A.W. all-electric house provided more comforts for £1,000 than any woman had ever dreamt of. Up to the present 284 teachers and 290 demonstrators had earned the Association's certificates. Washing machines were now being popularised and were available at prices to suit every household, and a walk round the Fair showed that manufacturers had not only given time and thought to the technical side of electric cookers but also to their general appearance; she was particularly glad to notice models equipped for simmering. Motor-driven apparatus was very cheap to use, and she would like to see electric motors employed more extensively in the household for such jobs as polishing silver and cleaning boots.

Thanking Lady Swaythling for her address, Mr. E. J. Jennings, secretary and commercial manager of the Birmingham Electric Supply Department, stated that the crux of the matter with regard to electrical development was the provision of cheap electricity and cheap appliances. The function, which was attended by over two hundred members, was presided over by Alderman Gelling, a member of the Fair Management Committee.

Mr. Beauchamp on Prices and Quality

At Birmingham on Saturday the official delegations included the Electrical Power Engineers' Association and the Electrical Association for Women. Mr. Frank Wain, chairman of the Publicity Committee, presided at a luncheon.

Replying to the toast of "The Electrical Industry," proposed by the chairman, Mr. J. W. Beauchamp, commercial manager of the Central Electricity Board, congratulated the Birmingham Chamber of Commerce upon the all-round improvement that had been made in recent years. He remarked that he was proud of the fact that he assisted to bring into being the Electrical Power Engineers' Association and the Electrical Association for Women. It appeared to him that they were complementary to each other, and in each case they had left their mark on the electrical statistics for the country. The women demonstrators had exerted a potent influence on the load factor, and he was satisfied that in their own way and by their reasoned talk in the homes of the people and elsewhere they could do effective work in the direction of salesmanship.

In no country was the prestige of manufacturers higher than it was here in respect of design and quality of workmanship. Manufacturers had in recent years tended more and more to combine for mutual protection, and there were some people who suggested that that was done in order to keep up prices. He did not subscribe to that view, however. By combination they were in a much better position to do intensive research work and to develop machine processes and to pay better wages; that was not possible in the old vicious days of cut-throat competition.

Mr. Beauchamp pleaded for consistency all round. It was the business of all of them when they preached about electricity to use electricity; they could not reasonably expect manufacturers to produce cheaper electric cookers when folks in the industry did their cooking by gas. They had in the electrical industry, combined with the grid system, a vast machine for electrifying this country, and they wanted the people to use electricity all the time and to use it through British apparatus and British wiring carried out to British rules and by British workpeople.

"Do not let us be misled," he continued, "by the mere question of price. The service we are giving is much better than any other service before the world to-day. We must persuade manufacturers to use British material and employ British workmen all the way through, and we ask manufacturers to treat us in the other departments of the industry similarly. They must not be insistent upon obtaining electricity at rates uneconomic to the producers. If there is full mutual co-operation substantial headway will be made in a very short time in the electrification of Great Britain."

The stands of the Chloride Electrical Storage Co., Ltd., and Messrs. J. H. Tucker & Co., Ltd., at Castle Bromwich

Others replying to the toast were Mrs. Flack (E.A.W. Demonstrators' Circle) and Mr. J. F. Sarvent (president of the E.P.E.A.).

Sir Felix Pole's Speech

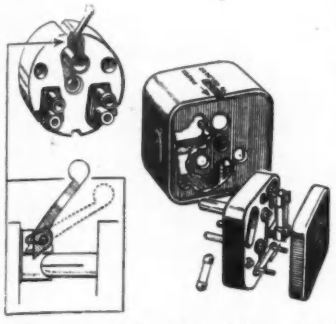
In the absence of Lord Hirst, due to indisposition, Sir Felix Pole, chairman of Associated Electrical Industries, Ltd., proposed the toast of "Industry" at the luncheon held on Tuesday on the occasion of the official visit of representatives of various electrical and allied associations. "The electrical in-

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Self-locking Sockets

Any make of 2-A, 3-pin standard plug can be fitted to the new M.K. self-locking socket, which can, therefore, be used for replacing any standard 2-A socket. A spring trigger device that grips the third pin as it is thrust home prevents its withdrawal until the projecting trigger is depressed. Either surface or sunk sockets in brown or white bakelite can be obtained. M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, London, N.18, supplies as standard a 2-A fused plug with finger guards.



The new M.K. self-locking socket fitted with a fused plug

The apparatus has been specially designed for situations where vibration tends to make the plug and socket work loose, but there is also scope for its use with electric clocks and in hospitals where it is desirable to preserve continuity of supply.

Improved "Flamera" Fires

MESSRS. FERRANTI, LTD., Hollinwood, inform us that their "Flamera" imitation coal type fires are to be provided with an improved artificial fuel embodying a combination of synthetic moulding with a flexible fabric; also instead of the usual flicker this fire has an improved flame effect.

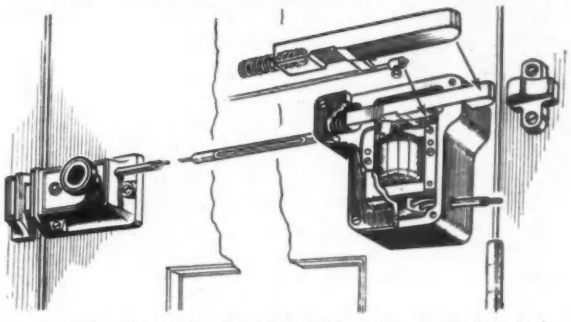
The "Flamera 45"

The fire is available in two forms known as the "Flamera 45" and "65," and fitted with two 1-kW or 1¼-kW elements.

An Electrically Operated Door Lock

The same company which some time ago introduced an automatic garage door opener has now designed a device intended to operate a "Yale" type door lock. It consists of an electromagnet which, when energised, withdraws a catch to release a plunger bar. The action of a spring moves the bar away from the door lock and, by means of a wire connecting it to the latch, the door is unlocked. The wire connection enables the lock to be operated also by hand.

As the door opens the plunger bar bears against a cam fixed to the frame of the doorway; this pushes the bar back into position, resetting taking place automatically. The push-button, or buttons, can be situated remotely from the door and, by fitting a spiral spring to the door, this can be made



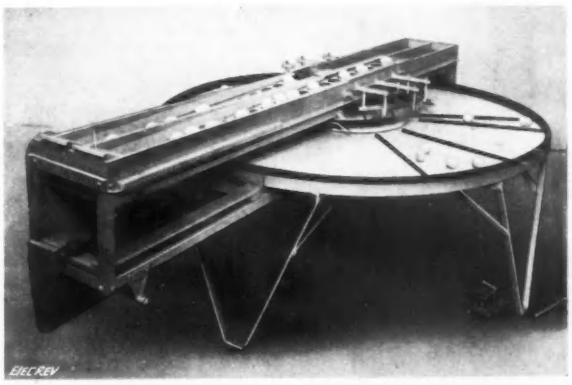
A sketch of the operating unit of the "Parlee" door lock

to swing open when the latch is released, making the apparatus particularly suitable for use in flats.

The makers are MESSRS. CONSTABLE, HART & Co., Broadway Buildings, Broadway, London, S.W.1.

Egg Grading

Egg grading at the rate of 7,500 eggs an hour is claimed by MESSRS. BINGHAM APPLIANCES, LTD., 48/50, Tooley Street, London, S.E.1, for their new "Precision" egg-grading



The "Bingham" egg-grading machine

machine. It will grade into four, five or six separate weights and is driven by a ¼-h.p. G.E.C. "Witton" motor.

An Adjustable Holder for Architectural Lamps

The drilling of one hole ⅞ in. in diameter in the troughing or panelling is all that is necessary to fix a new type of "Edisign" architectural lampholder produced by the EDISON SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, London, W.C.2. Two locking rings are fitted. By releasing the front ring the holder can be rotated and sufficient lateral adjustment obtained to ensure accurate centering to the peg cap of the lamp.

A resilient rubber washer for fixing over the peg cap of the

Electrical Visitors to the Fair (*Continued from preceding page*)

dustry, said Sir Felix, had a number of trump cards to play, but it was important to play them carefully. The grid was now a *fait accompli*, and to-day the majority of people would say that it was unquestionably a great advantage to the industry, more especially on account of the consequent collaboration between the various sections.

The possibility of electrification of railways was much nearer. Cheap finance was available and there was surely, in a populous area like Birmingham, a case for electrification. It had been said that if current could be supplied at ¼d. per kWh railway electrification was a practical possibility, and he was sure that Mr. Forrest, the Birmingham city electrical engineer, would be willing to sell it at less than that. The present stage of development of the industry was the result of considerable expenditure on research work on the part of the manufacturers, and buyers of electrical equipment should recognise that the labourer was worthy of his hire. We must keep our manufacturers in the forefront and we could only do this by recognising that there must be a reasonable amount of profit. Fair trading was not buying from the manufacturers who supplied most cheaply, but from the ones who were carrying out research work in order to supply reliable products.

Speaking of the improved efficiency in the generation of electricity, Sir Felix said that a unit of electricity could be produced for half the amount of fuel that was required a few years ago, and the thermal efficiency of power stations was 70 per cent. better than it was in 1922. Economies in the use of materials were responsible for a 150 per cent. improvement since 1915. The speaker looked to the day when the electrical industry would have full control of its interests. The electrical section of the Fair should be better supported and more fully representative, so as to show the foreign buyer what he could obtain. This country was perhaps more dependent than any other on its exports, and while we were right to cultivate the home market, overseas trade was of vital importance. British manufacturers were ready to meet any competition.

A vote of thanks was proposed by Mr. V. Watlington, director of the British Electrical and Allied Manufacturers' Association, and the visitors were welcomed by the Lord Mayor of Birmingham. The 300 persons present included Sir Duncan Watson, Mr. C. G. Morley New, Mr. R. T. G. French, Sir Percival Bower, Mr. J. A. Hirst and Mr. R. H. Fox. Mr. T. J. Kennedy, past-president of the Birmingham Chamber of Commerce, took the chair.

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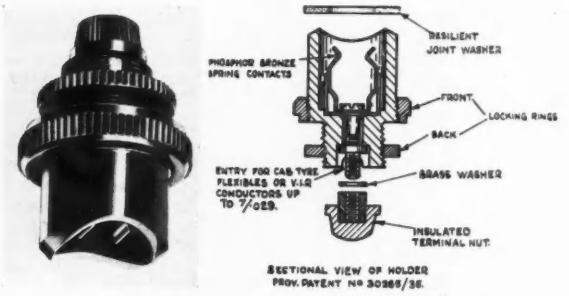
lamp fits into the seat of the lampholder and thus prevents moisture entering; this renders the holder particularly suitable for outdoor use, while the use of the rubber ring also minimises vibration and breakage of lamps.



The "Edisign" adjustable lampholder

The holder is suitable for mounting on troughing, &c., up to $\frac{5}{16}$ in. thick and is made of bakelite, a chromium-plated finish being available if desired. The spring contacts are of phosphor bronze, and the wiring is simplified by the provision of a large insulated terminal nut. A conduit box has been designed for use with these holders and is suitable for drilling clearance holes for $\frac{1}{2}$-in. or $\frac{3}{4}$-in. conduit. Supporting clips are available for use particularly with covered lamps.

Cut-outs with Meter Connections

A compact assembly of cut-outs, sealing chamber and meter of the all-insulated type has been produced by BRITISH INSULATED CABLES, LTD., Prescot. There are no exposed leads, the connections between the cut-outs and the meter being enclosed in an extended terminal cover, giving a neat appearance and preventing unauthorised persons tampering with the meter connections. The extended terminal cover is provided with a "knock-out" way at each side for bringing out the leads to the consumer's wiring and, if necessary, a second pair of main leads. Two single-pole cut-outs are fitted with high rupturing capacity fuses, and the sealing chamber has four entries.

The B.I. cut-out assembly

Welding Tips

"Durode" welding tips have recently been put on the market by MESSRS. THOMAS BOLTON & SONS, LTD., Widnes, Lancs, for spot welding machines. They consist of copper alloyed with a combination of other metals to increase endurance without impairing conductivity to any appreciable extent (a minimum conductivity of 80 per cent. of the annealed copper standard is guaranteed). Finished welding tips of any size or shape can be supplied in "Durode," and it is also available in the form of rods for customers who prefer to machine their own tips.

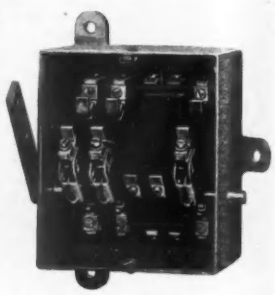
An Electric Burglar Alarm

An electric burglar alarm is the latest device introduced by CLEAR HOOTERS, LTD., 79, Lombard Street, Birmingham. It comprises an electric hooter which is connected to a switch operated by a door as it opens; actually several doors can be made to operate one unit, or more than one unit can be operated by one door. The alarm can be reset immediately by restoring the operating lever to the horizontal position, or it can be put out of action by fixing the lever in a horizontal position by means of a spring clip.

A Loom Switch

A loom switch for use on circuits rated at up to 5 A has been introduced by MESSRS. ERSKINE HEAP & CO., LTD., Lancashire Switchgear Works, Caroline Street, Salford.

It has a welded sheet-steel case and lid with robust rolling self-cleaning contacts. Bakelite insulation is used throughout, and easy adjustment is provided for the loom control arms. A stop prevents the moving contacts touching the case, and there is a special spindle bearing, *i.e.*, the spindle does not run in holes in the sides of the case.



The Erskine, Heap loom switch

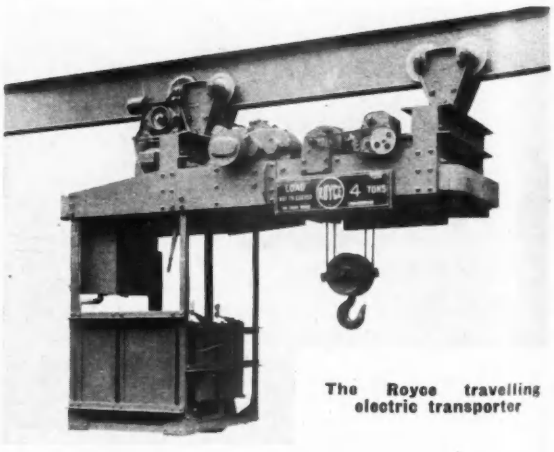
The cable connections can be arranged either at the top or the bottom, or at one end, if required. Plain holes are normally provided for bushes or incoming and outgoing conduit, but armour glands can be obtained.

A Travelling Hoist

An electric transporter with a working capacity of four tons is being introduced by MESSRS. ROYCE, LTD., Loughborough. The hoist will lift four tons at the rate of 50 ft. a minute. Full load travels at a speed of 450 ft. per minute.

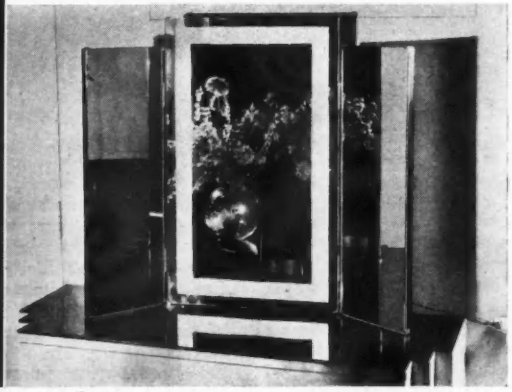
All high-speed hoist gears are enclosed in cast-iron oil-tight cases. Bearings are either of the ball or roller type, depending on the speed of rotation.

Both lifting and travelling motions are fitted with automatic electric brakes, which are applied automatically when the operating current is switched off. The bogie construction allows the transporter to negotiate curves having a radius as small as 16 ft. Motors, controllers and resistances and overwinding switches are all constructed by the company.



The Royce travelling electric transporter

Mirror lighting fittings for bedroom decoration—two of Messrs. Troughton & Young's "Halo" models



Illumination Control

Considerable interest is being taken at the British Industries Fair at Castle Bromwich in a shop window (equipped by CAPASWITCH, LTD., 6, Lloyd's Avenue, London, E.C.3) which lights up automatically on the approach of potential customers. The apparatus, which is somewhat similar in design and appearance to an all-mains radio receiver, may be placed in any suitable out-of-the-way place, and it is operated by the capacity effect of the body on a fine wire aerial concealed inside the window. The range can be adjusted to suit conditions. No structural alterations are necessary for installation and an illuminated sign inviting "approach" is supplied with each apparatus.

German Electrical Exports

Slight recovery last year

ACCORDING to the recently issued returns of Germany's foreign trade in 1935, electrical machinery exports were 141,214 double centner (1 d. centner=220.5 lb.) in weight and 29,560,000 Rm. in value, compared with 115,370 double centner valued at 30,215,000 Rm. in 1934; while exports of other goods in the electrical group were 630,776 double centner, valued at 176,783,000 Rm. against 512,657 double centner valued at 168,832,000 Rm. in the preceding year. On the whole, therefore, the electrical trade showed a slight recovery on 1934, but was well below the level of the years 1929-1933. The totals mentioned do not include a certain amount of electrical material which is classified under other headings.

Imports showed a marked decline on 1934, those of electrical machinery falling in value to 2,152,000 Rm. as against 3,824,000 Rm. and of other electrical material to 17,353,000 Rm. as against 21,982,000 Rm. It is noteworthy that the comparative figure in 1930 was double that of 1935.

The following statement shows the values in thousands of Reichsmarks, weight in double centner, and in some instances the number of pieces, of electrical material exported from Germany during 1935, together with the values and the principal countries of destination of the more important groups of articles.

Outstanding destinations for the dynamo, motor, &c., group were:—Up to 5 double centner: Belgium, Holland, Sweden, India, Argentina, Brazil, China. From 5 to 30 double centner: Argentina, Brazil, France, China and India. Over 30 double centner: France, Japan, China, Portugal and Brazil.

	1935.	Inc. or dec.
Lighting and starting apparatus for motor vehicles—		
Value Rm. (1,000)	2,570	– 1,500
Number	64,900	– 17,330
Weight (double centner) ...	5,890	– 1,290
Dynamos, motors, convertors and transformers, up to 5 double centner—		
Value...	14,500	+ 330
Number	1,213,970	+ 101,370
Weight	55,920	+ 10,690
Dynamos, motors, convertors and transformers, from 5 to 30 double centner—		
Value...	4,680	+ 870
Number	2,850	+ 895
Weight	32,080	+ 11,280
Dynamos, motors, convertors and transformers, over 30 double centner—		
Value...	5,330	– 200
Number	400	+ 70
Weight	40,720	+ 5,790
Armatures and commutators—		
Value...	2,480	– 140
Weight	7,600	+ 390
Cable—		
Value...	11,620	+ 850
Weight	254,380	+ 70,310
To Holland	2,410	+ 520
„ Sweden	1,020	+ 200
„ Argentina	770	– 1,630
„ Uruguay	420	– 160
„ Bulgaria	540	+ 490
Accumulators, plates, etc.—		
Value...	2,970	+ 570
Weight	33,960	+ 8,760
To Holland	860	+ 150
„ Finland	80	– 20
„ Argentina	200	+ 40
„ Brazil	70	– 10
„ Sweden	190	+ 20
„ Denmark	70	– 20
„ Turkey	280	+ 245
Electric irons—		
Value...	670	+ 80
Heating and cooking apparatus—		
Value...	6,350	– 250
Galvanic batteries and parts and heating elements—		
Value...	2,030	+ 100
Weight	17,340	+ 2,540

	1935.	Inc. or dec.
Measuring and recording instruments—		
Value...	18,690	+ 810
Weight	16,120	+ 1,710
To Soviet Union	540	– 680
„ Belgium	800	– 140
„ Holland	2,130	– 260
„ France...	950	+ 250
„ Great Britain ...	1,230	– 280
„ Sweden	1,640	+ 380
„ Argentina	590	+ 260
„ Spain	990	—
„ Italy	1,230	+ 100
„ China	900	+ 280
Metal filament lamps—		
Value...	9,530	+ 80
Thousands	46,340	+ 5,330
To France...	1,120	+ 120
„ Denmark	730	+ 100
„ Norway	450	– 40
„ Italy	800	+ 150
„ Switzerland	490	– 130
„ Argentina	550	– 50
Telephone material—		
Value...	14,770	+ 2,770
Weight	9,950	+ 2,270
To France...	420	– 80
„ Italy	2,640	+ 590
„ Holland	3,250	– 420
„ Uruguay	140	– 740
„ Bulgaria	1,550	+ 1,530
Wireless material—		
Value...	26,630	– 310
Weight	37,480	+ 2,220
To Belgium	1,070	– 520
„ France...	2,770	+ 10
„ Italy	1,920	+ 1,180
„ Holland	4,530	– 790
„ Sweden	2,050	+ 310
„ Switzerland	1,320	– 320
„ Czechoslovakia ...	960	– 370
„ Argentina	800	– 380
Safety and signalling apparatus—		
Value...	3,630	+ 130
Weight (double centner) ...	7,400	+ 790
To Great Britain ...	330	– 30
„ Italy	200	– 50
„ Switzerland	430	+ 130
„ Holland	630	+ 70

	1935.	Inc. or dec.
Ignition apparatus, etc., and parts (excl. magnetos) and elec. accessories for motor vehicles—		
Value...	9,720	– 460
Weight	12,220	+ 140
To Belgium	350	– 80
„ France...	920	– 160
„ Italy	1,400	– 650
„ Sweden	790	– 20
„ Japan	640	+ 100
„ Great Britain ...	1,190	+ 280
„ United States... ...	430	– 230
Apparatus for lighting, power transmission, electrolysis, resistances, etc.—		
Value...	52,290	+ 1,240
Weight	167,110	+ 17,880
To Belgium	3,330	– 270
„ Denmark	1,420	– 300
„ France...	2,980	– 2,020
„ Italy	2,610	+ 10
„ Holland	6,160	– 740
„ Sweden	6,560	+ 1,060
„ Argentina	1,670	+ 70
„ Great Britain ...	2,200	– 100
Telegraph or telephone insulators—		
Value...	1,790	– 120
Weight	24,110	+ 2,350
Electro-medical and dental apparatus—		
Value...	11,210	+ 2,400
Carbon and brushes, microcarbons, etc.—		
Value...	1,570	+ 240
Weight	780	+ 70
Arc lamp carbons—		
Value...	1,340	– 30
Weight	3,770	– 20
Electrodes—		
Value...	5,150	– 1,960
Weight	109,360	– 42,640
Conduit tubes of paper or cardboard—		
Value...	1,210	+ 16
Weight	31,210	+ 7,87

Canvassing—Then and Now. By H. J. Kennedy

Recollections and suggestions

FOR thirty-six years I have been canvassing and obtaining consumers for electricity undertakings, and am still at it. Are there any other old-timers still keeping me company, and telling the same old story day after day, apparently for ever and ever? I attended a school for canvassers a few weeks ago and listened to the methods suggested to obtain a further million consumers. I wondered if this million would be as hard to get as the first, some of whom I obtained, and whether "standardised" methods of approach, would expedite the getting of the million.

Before me, as I write, are three legal-looking documents, which were signed in my presence by prospective consumers: one for the hire of a cooker, kettle and washboiler and two for lighting installations of six points each, to be paid for through the medium of a slot meter—my day's work, plus an evening. In the case of the lighting installations, I very much doubt whether the consumers-to-be understood anything of the contents of the agreements which they signed—or whether they cared. They had purchased mains wireless sets, which was an incentive to install electricity, and the landlords were willing to agree to the fittings being installed, as no liability attached to them.

In the case of the cooker agreement, the prospective consumer was assured that his liability was for only eight quarterly payments of 8s. 6d., so to please his wife, who wanted to get rid of a dirty-looking gas cooker, he signed without reading the agreement. Is it necessary to surround electricity supply with these formidable agreements? In any case they would never be produced in a court of law, as litigation would not pay any supply authority. If a million more consumers are to be obtained quickly, as they can be, why must the canvasser waste time explaining legal phrases: simplify his job for him and get quicker results!

Even in the old days of demand indicator charging, &c., explanations took less time than explaining hire and hire-purchase agreements with which we canvassers are now saddled. I am often told that Drage's can wrap up a £500 parcel in less paper than we do a £5 installation. Prospective consumers don't want us about their house all the evening explaining phraseology, and canvassers want to make their evenings worth while. Does any old brother canvasser still exist who can remember the days of the carbon lamp, when the flat flame gas-burner was still about, and the gas mantle temporarily saved the situation for the gas industry. Does he remember the pull we had then, especially with shop-window lighting and safety from fire. Then, as now, it was the cost of installing fittings that held us back, but we got over that by a simply-worded document which was not filled with legal phrases. The company would install free of cost, six lights of 16 or 32 c.p., provided the prospective consumer agreed to consume not less than six shillings' worth of juice a quarter. As we took jolly good care that all the gas-fittings were removed as soon as we had the light on the fittings remained "put," in fact, most of them exist yet.

What a run we had! I remember the contractors putting installations in at 15s. a point—three in the window, two in the shop and one in the shop parlour, all the little shopkeepers showing the way to the big ones. And then the arc lamp stunt—two in series outside the larger shops, so that the gas-fittings could be taken out of the windows, where they faded the drapers' goods, or baked the grocers'. Our slogan was "Two lamps for the price of one, and what a light!"

Then came the attack on householders; if the small shopkeepers could afford electric light so could they. Six lights went nowhere, so we sat up and thought it out. Then we said to the customer: "You buy six and we will give you six—twelve points complete with opal or fancy shades for a 'fiver,'" and it came off; but inserted in the agreement was still the minimum of six shillings a quarter, and both the supply company and the contractors did well. We told the story of the dirty ceiling, the burnt matches, and the breaking of the gas mantle when one went to light the gas in the dark, and the lovely thought of putting your hand round the door as you entered the room, and behold, the switch! the light! why Aladdin wasn't in it! All for 6d. a unit—those were the days!

Thirty odd years ago, we canvassers would have thought that we had got into an electrical Arcadia, if we were able to talk of halfpenny units; the lowest figure I ever got down to was .8d. for a guaranteed minimum of 500,000 power units a year, and 4½d. per unit for house or shop.

And then the factories. "Out with your steam-engines, gas-engines, suction plants, hand cranes, &c.," we said to the owners. They didn't believe that electricity was cheaper and could do their work as efficiently. We took their running costs; scrapped their lines of shafting, loose pulleys, &c.; broke their plant up into sections; and when we had carefully estimated the actual applied h.p. for each section and its varying load, and found that they had no idea of what they were wasting in transmission, we gave them an estimate of the cost of installing motors, offered to take their existing running charges over a number of years, and when we had recovered the installation cost from the saving we estimated to make, we would hand over the new plant without further payment. The consumer thought he was on a winner, that he couldn't lose anyway, and that his annual balance-sheet would look good with a new plant on it, plus the cash for the sale of his scrapped plant.

What happened? We had a comfortable cover in profit on the installation; the saving proved more than we estimated, as we had been cautious; the consumer woke up as to what we were likely to make out of him, and after six or twelve months he offered a cash settlement to save his unbelieving hide; another satisfied consumer was there to refer to; and so on to the next job. How many steam- or gas-engines are left in congested town areas where there is a progressive electrical undertaking? If there are any, where's the canvasser to have a shot at this old idea?

Canvassing is a fine occupation. Don't worry about being called anything else; what's in a name? The consumers or people you call on know you only as the man from the electricity works. You should have a decent suit, a decent manner, a cheerful outlook, and an even temper; if you are snubbed at one house, at the next you may be asked in. All you need care about is getting a good backing from your chief, taking your salary and piling up your commission, as best you can.

Don't blackguard the gas-man; look upon him as a friendly enemy, for without his competition we shouldn't be wanted, and he is the chap who helps us keep our jobs. Remember, he has lost nearly all his illuminating therms and his power therms, and if we keep on as we are doing, his cooking therms will disappear also, but may this be long delayed—or we may disappear too.

We canvassers know what we are up against; we know that the gas publicity organisation has a better-equipped advertising and representative battery than we have, and we know that unless our immediate superiors have had experience in the matter of tackling consumers in their own homes, how hopeless it is to get them to see our point of view. The armchair high-pressure salesman theorist may be thought well of at headquarters, but let him come down to the signing on the dotted line, and then he will begin to learn.

Parliamentary News (BY OUR SPECIAL REPORTER)

IN the House of Commons on February 17th, Mr. Anstruther-Gray asked the Minister of Transport whether he possessed any statistics to show the number of fatalities in the last two years which had been caused by defective electrical installations, especially in domestic circles; and whether he was satisfied that the rules and regulations for the electrical equipment of buildings were efficient and thoroughly enforced.

Mr. Hore-Belisha said that electrical fatalities in non-industrial premises were not in ordinary cases reportable to his Department or to the Home Office. Fifteen such fatalities came to notice in 1934 and eighteen in 1935, but he was unable to say how many of these were caused by defective electrical installations. The statutory regulations relating to the use of electricity in industrial premises did not apply to domestic premises, but the Electricity Supply Regulations, 1934, made by the Electricity Commissioners, enabled supply undertakings to refuse to connect premises in which the installations were not in accordance with safe practice.

Mines Electric Winding Appliances

On February 20th Mr. E. Williams asked the Secretary for Mines whether he had knowledge of the death of two men at the No. 2 Pit, Wyndham Colliery, Ogmore Vale, alleged to be due to a faulty electric winding signalling appliance; whether an inquiry had been held by H.M. Inspector of Mines; what were the findings; and what action he proposed to take to prevent the recurrence of these accidents.

Captain Crookshank said that very full investigations were made by H.M. Inspectors into the two accidents at this colliery in July and December last and no defect in the electrical shaft signalling apparatus which would have rendered it liable to give a false signal could be discovered. The management had, however, agreed to adopt a scheme for the systematic testing and examination of the signalling apparatus, which had been prepared by the Electrical Inspector of Mines, and was designed to ensure that no latent defects in the installation which might give rise to a false signal would escape notice.

The Yorkshire Electric Power Bill

The Yorkshire Electric Power Bill came before the Standing Orders Committee of the House of Commons on February 25th on an application that Standing Orders not complied with might be dispersed with. The promoters stated that negotiations involving the expenditure by the North Lincolnshire & Howdenshire Electricity Co., Ltd., of a substantial amount of capital to meet demands arising out of industrial developments in its area justified the Power Co. in seeking an extension of its powers of investment in the North Lincolnshire Co. The company asked, therefore, that it might be allowed to invest, without limit as to amount, in the securities of any authorised undertakers (including the North Lincolnshire Co.) to which it was giving a bulk supply. It was also desired to have authority to appoint the Power Co.'s engineer and manager as a director, in place of a deceased director, and as managing director.

Sir Dennis Herbert announced that the Committee would grant a dispensation from the Standing Orders and the Bill would be allowed to proceed.

Parliamentary Lamps

Mr. H. Williams asked the First Commissioner of Works on February 24th what percentage of the electric lamps in the Houses of Parliament were of the gasfilled type; and how long would it be before this type entirely superseded the less efficient types still largely in use.

Mr. Ormsby-Gore said that about 75 per cent. of the electric lamps in the Houses of Parliament were of the gasfilled type. He was not in a position to forecast the date by which this type only would be in general use, as substitution of gas-filled lamps where available took place as the old types wore out.

In the Courts

IN the Companies' Court on February 24th Mr. Justice Crossman had before him a petition by Mr. J. B. Breed, of Cleethorpes, Lincolnshire, for the compulsory winding-up of the British Crystal Lamp Co., Ltd., Northumberland Avenue, W.C.

Mr. Sykes, for the petitioner, said that there was a dispute as to the amount of the petitioner's debt. He said that it was £549 and the company said it was £529. Mr. Brayburn, for the company, said that a judgment had been obtained by the petitioner on two counterclaims tried before the Official Referee (Mr. C. M. Pitman, K.C.) in December last year (reported in the ELECTRICAL REVIEW, December 27th, page 899). Execution on the judgment was stayed subject to certain conditions being complied with. A debenture-holder of the company had put in a receiver and thus prevented the company from handling its assets or bringing the money into Court. The company afterwards served notice of appeal from the judgment of the Official Referee, and the appeal was now pending. In these circumstances he asked that the present petition should be adjourned. If that appeal succeeded the petitioner, Mr. Breed, would no longer be a creditor of the company and there were no other pressing creditors.

At the conclusion of the arguments his Lordship said he would make a compulsory winding-up order, but he would direct that it should remain in the office for a fortnight. If in the meantime security were given to the satisfaction of the Registrar for the payment of the petitioner's debt the order for the winding-up would not be drawn up and there would be an order substituted dismissing the petition.

Winding-up Order

In the Companies' Court on February 24th, Mr. Justice Crossman made a compulsory order on a creditor's petition for the winding-up of Raytonic Heating Co., Ltd.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Higher Standards Wanted

Speaking at the Birmingham Electric Club on Friday Mr. A. C. Barfield urged that the club should take a lead in securing improvement of the standard of electrical materials and workmanship. He advocated the establishment of a proving house or test laboratory, the examination and registration of wiremen, and the setting up of a standard code for electrical installation work. A second paper was read by Mr. R. F. Mathieson on "The Choice of a.c. Motor Starting Gear."

Employment in January

Employment in the engineering industry during January showed a slight decline in most sections, and was fair to moderate on the whole, being good in electrical engineering. The *Ministry of Labour Gazette* states that the number of unemployed in the engineering industry increased by 5,213 to 100,494, and the percentage from 9.7 to 10.2 (13.2 per cent. in January, 1935). In the electrical engineering section the number of unemployed was 5,482 or 5.9 per cent., as against 5.2 per cent. in December and 7.8 per cent. in January, 1935. The unemployed in the electrical wiring and contracting industry totalled 5,041, the percentage rising from 11.6 to 14.3 (15 per cent. in January, 1935). In the electric cable, apparatus, lamps, &c. group the number of unemployed was 14,159, the percentage increasing from 8.4 to 10 (10.3 per cent. in January, 1935).

South London Exhibition

At the South London Exhibition at the Crystal Palace from March 4th to March 14th next, the County of London Electric Supply Co., Ltd., the South Metropolitan Electric Light & Power Co., Ltd., the South London Electric Supply Corporation, Ltd., and the West Kent Electric Co., Ltd., will have a comprehensive display of the latest domestic electric apparatus, in addition to a completely furnished flat of six rooms and an interesting collection on a large and novel scale of electric clocks by Smiths English Clocks, Ltd. The new tea cabinet which boils the water, makes the tea and awakens the sleeper by an alarm-clock will be demonstrated.

Johannesburg and German Goods

A discussion took place at a meeting of the Johannesburg City Council regarding a recommendation of the Finance Committee that a tender of Siemens (S.A.), Ltd., for the supply of cable should be referred back. Mr. D. H. Epstein, chairman of the committee, in moving the recommendation, said that there was a considerable difference between the German and the British tenders. He contended that the conditions prevailing to-day were such as to justify the Council in rejecting the German tender, although it was 60 per cent. below that of the British one. They should obtain tenders where the goods were manufactured under fair conditions. Mr. T. P. Gray, chairman of the Tramways and Lighting Committee, said that there was no difference in the quality of the goods, but the German tender and alternative tender were 69 per cent. and 40.2 per cent., respectively, below the British tender. Mr. F. T. Howarth contended that only 10 per cent. of the cost of the manufacture of the cable was labour. Of the material, 75 per cent. was copper and the copper came from Rhodesia. The recommendation was carried.

E.D.A. Activities

Most of our readers by this time will have seen some new E.D.A. advertisements in the daily and weekly newspapers. These form a part of the current campaign which the Association is conducting throughout the country and in each of them there appears the quaint figure depicted herewith (reproduced from a folder containing proofs of the advertisements). It will be noticed that this has three points, symbolising the three plug points which are recommended in the advertisements as a minimum for each room. The first of the advertisements appeared in the national Press during the week ended February 15th; the others are timed to appear at regular intervals right up to the end of May. The Association has also prepared a series of advertisements which have been designed to enable members to link up their own advertising with the national effort.

A special series of lectures with practical demonstrations is being given by E.D.A. at the Building Centre, 158, New Bond Street, London, W.1, for the benefit of electrical sales staffs in the large London stores. These lectures commenced on February 4th, and will conclude on Tuesday next. The following stores have been represented: Army & Navy, Barker's, Derry & Toms, Gamage's, Harrod's, John Lewis, Maple's, Selfridge's and Whiteley's. The lecturers have been Mr. P. Honey, of E.D.A., whose talks have covered the growth of the domestic load, how electricity is measured, adequate lighting and plug points, accessories and the reason for earthing; and Miss. E. Robinson, of the Electrical Section of the Building Centre, who has spoken on electric table cooking and its costs, and the relationship of space to be heated by electric fires and the watts required. In her concluding lecture on Tuesday next Miss Robinson will deal with the fundamentals of electric lighting, helping the customer to choose the correct fittings.

An Industrial Exhibition at Newcastle

Philips Industrial (Philips Lamps, Ltd.), in conjunction with its Newcastle agent, Mr. J. A. Woods, recently gave a demonstration, arranged by the North Eastern Electric Supply Co.,

A demonstration of electro-technical apparatus by Philips Industrial at Carliol House, Newcastle-upon-Tyne.

Ltd., of electro-technical apparatus for use in industry, in the power demonstration room, Carliol House, Newcastle-on-Tyne. The apparatus shown and demonstrated included oxide cathode rectifiers (for change-overs); rectifiers for battery charging; welding rectifiers; welding electrodes; industrial X-ray apparatus; condensers for power-factor correction; amplifying equipment; "Philora" industrial lighting and floodlighting; and lighting fittings. On February 11th two films were shown at the lecture theatre, Carliol House. One was an X-ray cinematograph film of the "Transfer of Material Through the Welding Arc," whilst the other was entitled "Electric Arc Welding," and during the evening a demonstration was given of visual X-ray examination of welds. A window was placed at the disposal of Philips Industrial by the North Eastern Co., and it was lighted by a Philips "Philora" 250-W mercury lamp in a type NB vitreous enamelled steel industrial reflector.

A Radio Annual

We have received the 1936 edition of "The Broadcaster Radio and Gramophone Trade Annual" (The Broadcaster and Wireless Retailer, 5s., post free). This guide is divided into four major parts. The first deals with trade organisation, the second with radio service and technical matters of concern to the retailer, the third is a commercial and legal guide, and the fourth contains the directories. The information includes quick test data for sixty receivers, characteristics of valves, supply voltages of towns in Great Britain, and directories of manufacturers and wholesalers.

Commercial Electrical Travellers

The annual dinner of the Electrical Trades Commercial Travellers' Association was held on February 21st at the Connaught Rooms, W.C.2, Mr. S. Johnson, chairman of the Association, presiding. In proposing the toast of "The President," Mr. Johnson expressed regret at the absence of Mr. M. J. Railing, the president, who was suffering from a chill, and read a message from him. Mr. Johnson referred to Mr. Railing's long and active association with the electrical industry, and said that while they regretted his absence they were fortunate in securing as his deputy Mr. C. Wilson, who had been associated with Mr. Railing for many years. Mr. Wilson, in responding, said the Association was a real active one to which all qualified travellers should belong. Its objects were laudable, and he was surprised that with nine past-presidents and a long list of vice-presidents, their membership was only 220. Mr. Hornby proposed "The Association and its Charities," and said he saw no reason why it should not extend its

activities into the provinces. In responding, Mr. Johnson said that they had not had one claim upon their benevolent fund during the past twelve months. There were difficulties regarding the extension of the Association's activities into the provinces, but these were not insurmountable, and he hoped eventually to get electrical travellers outside of London into the Association. The toast of the visitors was proposed by Mr. L. Moir, and Mr. P. N. King proposed "The Chairman and Officers." A collection for the Association's charities realised £20, while Mr. Railing sent a cheque for ten guineas.

A photograph taken at the dinner is reproduced on page 337.

Architectural Lighting

The accompanying view of the exterior of the showrooms of the Gellygaer U.D.C. Electricity Department shows an application of standard architectural tubular lamps. The

A Cosmos sign at the Gellygaer U.D.C. Electricity Department's showrooms

sign consists of standard Cosmos "Decora" lamps mounted on polished black "Traffolyte," a product of the Metropolitan-Vickers Electrical Co., Ltd. The letters are white opal, the border is orange-amber and the centre-piece is green. The total loading of the sign is 3 kW, and brilliancy is obtained without glare.

French Imports of Domestic Electrical Appliances

The appended table shows the French imports of domestic electrical appliances during the nine months ending with September last as compared with the corresponding period of 1934. The French fr. totals have been converted to sterling at 75 to the £.

	Jan.–Sept. 1934.	Jan.–Sept. 1935.
	1,000 fr.	1,000 fr.
Electric fires and stoves	3,215	2,508
Electric irons	125	32
Electric vacuum cleaners, boot cleaners, etc.	3,341	1,762
Electric refrigerators and parts	13,086	10,059
Electric fans	911	556
Total fr.	20,678,000	14,917,000
Total at 75 fr. to £	£275,705	£198,895

As regards the exports of domestic electrical appliances from France, only the gross total is now given in the French official returns, this for the nine months under review amounting to £93,135, as against £113,360 in the corresponding period of 1934.

Duty on Copper Goods

The Import Duties Advisory Committee gives notice of an application for an increase in the import duty on tubes, sheets, strip, plates, discs and circles, manufactured wholly of copper or of alloys containing more than 50 per cent. by weight of copper. Any representations which interested parties may desire to make with regard to these commodities should be addressed to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than March 12th next.

An Imitation-fuel Convector

We regret that by a slip of the pen the new convector with imitation fuel made by the British Trane Co., Ltd., and illustrated on page 273 of our last issue was called a "Thermidair," whereas the maker's name for it is "Vectair."

The Artic Fuse & Electrical Manufacturing Co., Ltd., asks us to state that it has been manufacturing combined radiant heaters and convectors for the past six or seven years.

A Synchronous Clock Agreement

An agreement has been arrived at between the members of the Synchronous Clock Conference and wholesalers whose names are included in a list approved by the Conference, whereby the signatories undertake to purchase only clocks manufactured by members. The object of the agreement is to ensure that every channel of distribution receives its fair share of profit on transactions in respect of synchronous electric clocks. The scheme is designed to ensure that retail prices are rigidly adhered to; that retail discounts will be maintained; and that all clocks made by members will pass the tests imposed by the British Standards Institution.

Swansea Conference on Welding

A lecture-conference on welding, with exhibits relating to technique and testing, is to be held on March 4th in the Engineering Department, Singleton Park, of the University College of Swansea. Over 350 visitors from works all over South Wales and Monmouthshire have expressed their intention to be present. Others wishing to attend should communicate at once with Prof. F. Bacon, who is acting as the organising secretary.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry announces that there will be no "cost-of-living" alteration in wages on the third pay-day in March.

New E.C.A. Members

At the last meeting of the Council of the Electrical Contractors' Association the following were admitted to membership of the E.C.A.:—

J. S. Walford (Ilford Electrical Co., Ltd.), Ilford; R. A. Jones (Jones & Jennings), Kingsway, W.C.2; T. Wescott (T. Wescott & Sons), London, N.W.10; K. I. Rayment (Lowestoft Electrical Co.), Lowestoft; F. Thirkettle, Ipswich; G. F. Whayman, Ipswich; J. L. Warren, Taunton; W. L. Edwards (W. L. Edwards & Co.), Ammanford; T. J. Phillips, Port Talbot; H. R. Kemble, Swindon; T. Johnston, Belfast; L. Hoyle, Halifax; T. Pitts, Laisterdyke, Bradford; D. Jowett (Roberts & Jowett), Bradford; D. Macrae, Appleby; E. W. Devenish (Border Electrical Service), Berwick-on-Tweed; J. Barratt (G. Barratt), Stockport.

New Electricity Showrooms

The Foots Cray Electricity Supply Co., has received permission, subject to certain conditions, to erect offices and showrooms in St. John's Road, Sidcup.

The Sheffield *Daily Independent* reports that preparations are being made for the erection in the centre of Sheffield of premises for the Corporation Electricity Department, the estimated cost of which is £250,000. The premises are to contain showrooms and offices and a demonstration room to accommodate 250 people. These facts were divulged by Ald. J. A. Longden (chairman of the Electricity Committee) at the annual dinner of the Sheffield branch of the E.C.A. held on February 21st.

For Sale

Aberdeen Electricity Department has turbine plant for disposal.

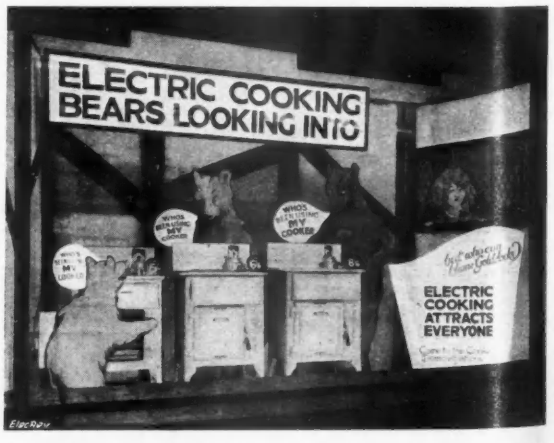
Erith U.D.C. Electricity Department has for disposal rotary convertors and other plant.

Portsmouth Corporation Electricity Department has for sale d.c. meters and motors.

(See our classified advertisements.)

Contractors' Dinners

The annual dinner of the Glasgow Branch of the Electrical Contractors' Association of Scotland was held at the Grosvenor, Glasgow, on February 20th, Mr. R. A. Ure presiding. Colonel J. Maurice Arthur, president of the Glasgow Institute of Architects, proposed the toast of "The City of Glasgow," and Bailie Victor D. Warren replied. Mr. J. W. Mayall, president of the Electrical Wholesalers' Federation, proposed the toast of "The Association," and Mr. W. Finlay, W.S., the secretary of the Association, who responded, said that the Asso-


ELECTRIC COOKING BEARS LOOKING INTO
WHO'S INSTALLING MY COOKER
WHO'S INSTALLING MY COOKER
ELECTRIC COOKING ATTRACTS EVERYONE

A novel display of electric cookers at the showrooms of the Hackney Electricity Department

ciation was out to support and enforce standard wages, good working conditions, and the use of the best British materials. It favoured the adjustment of fair conditions of contract by negotiation. For the past ten years it had been realised that some scheme of co-ordination and co-operation within the industry was necessary, but it had been found that to frame such a scheme was no simple matter. All the commercial sections of the industry were in agreement as to the necessity for a fair trading policy, and that the scheme now prepared was fair and equitable to all, including supply. Supply alone remained aloof, and to his mind the time had come to call upon it to join the other sections and to pull its weight in a united effort for the rationalisation and permanent good of the industry.

The Chairman proposed "The Guests," and replies were made by Mr. C. W. Sully, director of the Electric Lamp Manufacturers' Association, and Mr. A. G. Bruty, president of the Electrical Contractors' Association of England. Mr. H. M. Spiers, vice-president of the Association, gave the toast of the chairman.

There were 350 guests at the annual whist drive, dinner and dance of the Fylde and District Branch of the Electrical Contractors' Association. Mr. H. Seddon presided, and others present included Mr. J. Walsh (member of the Council of the E.C.A.), Mr. C. Furness (late borough electrical engineer, Blackpool), Mr. H. F. Shanahan (Blackpool electrical engineer), and the branch secretary (Mr. A. E. Huddart). Mr. C. Furness, proposing the toast of "The Association," said when he came to Blackpool in 1902 the sales were under 2,000,000 kWh per annum. Last year they exceeded 45,000,000 kWh. The average consumption now exceeded 320 kWh per head. He attributed much of this prosperity to the team work of electrical contractors. He hoped to see the membership doubled, and predicted that within six or seven years the present output would be doubled, and would approach 100,000,000 kWh per annum. Mr. John Walsh, of Blackburn, responding, said that Mr. Furness's retirement was a great loss to the district, and the chairman, on behalf of the branch, presented a pair of silver candlesticks to Mr. Furness, who thanked the branch for this gift.

New Showrooms at Woolwich

The new electricity showrooms of the Woolwich Corporation Electricity Department were inaugurated on February 20th last by the Mayor, Councillor H. Berry. Mr. Gourman, Chairman of the Electricity Committee, said the first showroom of the Council was opened in 1905 but was not an entire success, owing to its position, and was closed down in 1907. Three years later the showroom which had served their needs until December, 1934, was constructed. The number of consumers in 1903 was forty-eight. For 1934 the consumers were 15,831, and the sales 80,100,000 kWh. Since then the increases had been rapid and now there were 21,500 consumers, while it was expected that the sales this year would reach one hundred million kWh. They had on hire 6,157 cookers, 1,102 wash-boilers and 2,524 irons, while the sales of fires, vacuum cleaners, etc., had been very high. Hire, hire-purchase and assisted wiring schemes had been introduced. Mr. Grimmett of the Electricity Commission congratulated Mr. Elliott, the borough electrical engineer, his staff and others concerned, who were responsible for the erection of the showrooms.

The new building is situated in the main thoroughfare and has an imposing frontage with large display windows the centre one of which is of the non-reflecting type give a clear view to the large showroom beyond. The ground floor showroom has a varied display of domestic appliances, and every endeavour has been made to avoid "crowding." Special attention has been given to the illumination, the primary lighting being concealed. Ceiling lights have been installed around the walls with Holophane reflectors which give direct lighting without shadow. On the first floor there is a larger and further selection of appliances, most of which are in dustproof cases, ensuring no deterioration to fabrics, while other shades are shown illuminated so that the customer can gauge the actual effect.

On the second floor is a large lecture theatre, with a stage and a raised flooring, where a regular programme of afternoon lectures and demonstrations is given. It is hoped later to introduce talking film apparatus. Over the cookers in this theatre there is a clock which shows the time taken to cook a meal, and two dials which record the cost of cooking in pence during the demonstration. At the rear of the showrooms are the stores and offices, and we were particularly interested in an up-to-date card system adopted by the Electricity Department, whereby full details of the apparatus installed, the condition of appliances and sales of electricity to any consumer can be seen at a glance.

The Batti-Wallahs' Society

The next luncheon of the Batti-Wallahs' Society will be held on March 26th at the Hotel Metropole, W.C., when the chief guest will be Sir Clement Hindley.

E.D.A. Luncheons

The annual luncheon of the North West England and North Wales Area of E.D.A. was held on February 24th at the Grand Hotel, Manchester, when Mr. P. J. Robinson said that the electrical industry on the generating and distribution side had incurred a capital outlay of over £500,000,000, yet E.D.A. had the greatest difficulty in raising £50,000 a year for national advertising purposes, even though that sum was supplemented by £50,000 from the C.E.B. Over 70,000 men were employed directly in the electricity supply industry, in addition to thousands of others employed by the manufacturers. New consumers were being connected at the rate of 600,000 a year and he hoped they would top the million within the next twelve months as the result of the advertising campaign. The Lord Mayor of Manchester (Ald. T. S. Williams) said that although during the last nine years electricity prices had been reduced by half there was room for further cuts. If the price was one halfpenny per kWh he was sure the public would rise to the occasion. The production in 1935 was 17,565,000,000 kWh; it was estimated that in the next ten or fifteen years the output would be 50,000,000,000 kWh. The prizewinners in the Area Public Speaking Competition were Miss E. M. D. Pitts (Turton U.D.C.); Miss N. Griffiths (Liverpool Co-op.); Mr. L. G. Price (St. Helens); and Mr. H. Hewitt (Swinton and Pendlebury Co-op.); and in the Area Salesmanship Competition Miss Muriel E.

The new Woolwich Showrooms showing the exterior, the ground floor showroom (left), and a demonstration of electric washing in progress

Shepherd (Warrington Co-op.), Mr. J. Turrell (Trent Valley and High Peak Electricity Co., Ltd.), and Mr. J. Allen (Southport Corporation).

The annual luncheon of the S.W. England and S. Wales branch was held at the Grand Hotel, Bristol, on February 25th. Mr. E. W. Tole (chairman of the Branch) presided over an attendance of nearly 150 members and guests. Mr. Ian Orr-Ewing, M.P. (Weston-super-Mare Division) submitted the toast of E.D.A. and said the operations of the Association had contributed largely to the increased demand made upon undertakings and the cheapening of prices to the consumer. There was a great potential consumer in the electric battery vehicle and he considered that the development of this form of transport would do much to solve the traffic problems of our big towns and cities. Mr. A. C. Cramb, in reply, gave a résumé of the activities of the Association during the past twelve months and made an appeal for greater support for E.D.A. He eulogised the services which Mr. Tole had rendered not only provincially but national. Mr. E. W. Tole also acknowledged the toast and presented the prizes to the winners of the Area Public Speaking Competition. The winner of the first prize was Miss Penelope Williams and of the second Miss Mary Weeks (both of the Exe Valley Electric Supply Co., Ltd.). This company also supplied the winner of the Area men's final, Mr. H. Boyce, the runner-up in this heat being Mr. J. S. Stuckes, of the North Somerset Electric Supply Co. Mr. H. F. G. Woods gave the toast of the visitors, which was replied to by Mrs. M. George, J.P. (Mayor of Swindon).

Social Event

The annual carnival dance of the Igranic Electric Co., Ltd., was held recently at the Corn Exchange, Bedford, when nearly 500 members of the company attended. Among those present were Mr. G. A. Mower (chairman of the company) and Mr. G. R. Thursfield and Capt. L. M. Paterson (directors), and a contingent from the London and other offices of the company. During the evening the sports club trophies were distributed by Mr. Mower, and Col. B. I. Rolling, the general manager, thanked him and the other directors for their help which had enabled the Club to lease a new ground, which would be inaugurated on Whit-Monday.

A display of "Magicoal" fires installed recently by the County of London Electric Supply Co., at its Streatham showrooms

Finnish Electrical Trade

Finland's import trade in electrical goods during the past year shows good progress as compared with the preceding year, in that imports were increased in quantity by nearly 31 per cent. and in value by about 27 per cent. The aggregate value of imports in 1935 was 85.4 million Fmk. (app. £380,000) as against 68.8 million Fmk. (£300,000) in the preceding year. The following details are given in denominations of quantity, with corresponding figures for 1934 added in parentheses. Imports of accumulators were 442 tons (496), of dry cells 365 tons (404), of cables and insulated wire 1,466 tons (896), and of all other electrical machinery and apparatus, including wireless, 1,711 tons (1,219). Imports of incandescent bulbs aggregated 33 tons (56). The increase of cable imports is due to the fact that record activity was shown last year on the part of the post office, as nearly 12,000 km. of new telephone lines were provided. The marked advancement under the heading of electrical equipment is partly due to imports of equipment for the new 220-kW broadcasting station that has been erected at Lahti.

Making Four Radio Sets a Minute

On the occasion of a Press tour of the Perivale factory of the Philco Radio and Television Corporation of Great Britain, Ltd., it was stated that the present output schedule is four broadcast receiving sets per minute for the home, Continental and Empire markets. They range from a three-valve battery model to a large radio-gramophone employing four speakers. "All-wave" sets are obtainable from the five-valve to radio-gramophone size, while dual-wave motor-car sets are now made for both medium and long wave reception. It was explained that in order to ensure year-round employment for skilled workers the company now introduces its models at regular intervals throughout the year, instead of announcing a full programme annually as has been customary in the radio trade. A small machine tool-room has been established and some coil-winding machines have been installed, an extention to the factory being contemplated. Most of the component parts seem to be made elsewhere and are built up into complete receiving sets on moving conveyor lines of an advanced type, similar to those employed in large motor-car factories. Several of these production lines are in use, so that a number of models can be in production simultaneously, even the connecting wires being variously coloured and cut to the requisite lengths beforehand in order to simplify assembly as much as possible. Quantity production on these lines naturally involves considerable supervision and inspection, and it is said that one "expert tester" is employed for every four operatives engaged in constructional assembly.

Trade Announcements

Messrs. Ward & Goldstone, Ltd., are removing their Leeds office on March 1st to Central Chambers, 45, Woodhouse Lane, Leeds. The telephone number remains unchanged.

The Southampton branch of Messrs. Callender's Cable & Construction Co., Ltd., has removed to 17, Strand, Southampton. The telephone number remains unchanged.

Messrs. Keating & Miskin, Ltd., electrical engineers and contractors, are opening showrooms at 39-40, St. George's Place, Canterbury, early in March, and ask for manufacturers' catalogues.

Messrs. J. D. Morrison & Co., 10, Whitworth Street West, Manchester, have been appointed sole factory representatives for Bylock Electric, Ltd., for the sale of that company's vacuum cleaners, hair dryers, &c., throughout the North of England area.

The Leipzig Fair

The Leipzig International Industries Fair will open on March 1st. The Engineering and Building Fair will close on March 9th and the General Samples Fair on March 6th.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price, February 26th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£15 10s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3½d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£192	£3 dec.
Grade II ... ... ,,	£133	£2 dec.
Grade III ... ... ,,	£70	£1 dec.
c Brass (rolled metal 2" to 12" basis) ... per lb.	7¾d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	9¼d. to 10d.	—
c ,, Wire, basis ... ... ,,	7¾d.	¼d. inc.
c Copper Tubes (solid-drawn) ... ,,	10½d.	—
g ,, Bars (best selected) .. per ton	£68	£2 inc.
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£40 10s.	£1 inc.
d ,, ,, Wire Rods ... ... ,,	£46 10s.	£1 inc.
d ,, ,, H.C. Wire ... per lb.	7¼d.	¼d. inc.
f Ebonite Rod ... ... ,,	1/6 to 2/- plus	—
f ,, Sheet ... ... ,,	1/3 to 1/6 10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	8¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... per ton	67/6	—
i ,, Wire galv. No. 1, P.O. Qual.... ,,	£20	—
g Lead, English Pig ... ... ,,	£18 10s.	10s. inc
g Mercury ... ... per bot.	£12/5/- to £12/8/6	—
e Mica (in original cases) small ... per lb.	6d. to 1/-	—
e ,, ,, medium ... ,,	5/- to 10/-	—
e ,, ,, large ... ,,	10/6 to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, drawn bars & rods ,,	11¾d.	¼d. inc.
p ,, ,, rolled strip & sheet ,,	11¾d.	¼d. inc.
p ,, ,, wire ... ... ,,	1/0¾	¼d. inc.
o Platinum ... ... per oz.	£7	—
d Silicium Bronze Wire ... ... per lb.	8 7/8d.	⅛d. inc.
g Spelter ... ... per ton	£15 15s.	£1 2s. 6d. inc.
r Steel, Magnet, in bars ... ... per lb.	7¼d.	—
g Tin, Block (English) ... ... per ton	£207 10s.	10s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

New Catalogues and Lists

Vulcanised Fibre, Ltd., Shalford, Guildford.—A well-produced booklet containing illustrations of the company's works.

Crofts (Engineers), Ltd., Thornbury, Bradford.—Several leaflets dealing with machine-cut internal gears, worm wheels, spur gears, bevel gears, and double helical gears, &c.

Murex Welding Processes, Ltd., Ferry Lane Works, Forest Road, Walthamstow, London, E.17.—A technical publication entitled "Belfinish Electrodes."

Davidson & Co., Ltd., Sirocco Engineering Works, Belfast.—A booklet dealing with "Aeroto" fans for auxiliary mine ventilation.

Micanite & Insulators Co., Ltd., Blackhorse Lane, Walthamstow, London, E.17.—Booklets have been prepared on "Panilux" insulation, empire varnished insulating materials and micanite insulation.

Henry Simon, Ltd., Cheadle Heath, Stockport.—Particulars of wheat conditioners and driers.

David Brown & Sons (Hudd.), Ltd., Huddersfield.—"Radicon" bevel gear units are the subject of the latest publication.

Lightfoot Refrigeration Co., Ltd., Bush House, Aldwych, London, W.C.2.—A leaflet illustrating and describing the latest range of "Westinghouse" refrigerators.

Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, Oxford Street, London, W.1.—Leaflets dealing with cabinet and refrigerator type cookers.

Elexcel, Ltd., Victor Works, Broad Green, Liverpool, 14.—A catalogue of "Xcel" cookers.

Rhodes, Brydon & Youatt, Ltd., Waterloo Engineering Works, Gorsey Mount Street, Stockport.—A leaflet describing self-priming pumps.

F. W. Lechner & Co., Ltd., 61, Spencer Street, Clerkenwell, London, E.C.1.—Reprints on "Kabi" ganged potentiometers and switches.

Wilec, Ltd., 321, Commercial Road, London, E.1.—A price-list of electrical equipment and accessories.

Bankruptcy Proceedings

W. Roberts (described in the receiving order as R.W. Inductors, a firm), 203, New Haw Road, Addlestone, Surrey, radio manufacturers.—The first meeting of creditors was held in London on February 19th. The statement of affairs showed liabilities of £842, with a deficiency of the same amount. The failure was attributed to lack of experience and keen competition. The case, being a summary one, was left in the hands of the Official Receiver as trustee.

L. G. Hosier, Watling Street, Radlett, Herts, electrical engineer.—The public examination herein was held at the Court House, St. Albans, recently. According to the statement of affairs filed there were liabilities of £552 and no assets. The failure was attributed to heavy overhead charges. The examination was adjourned.

A. Robson (Anson Radio), wireless engineer, 147, Dickinson Road, Rushholme, Manchester.—Application for discharge to be heard on March 16th at the Court House, Quay Street, Manchester.

K. F. Butcher (Radiolectric Co.), radio dealer, 157, Hook Lane, Welling, Kent.—Discharge suspended for six months until July 22nd, 1936.

R. J. Eggleston, electrical merchant, Huddersfield Buildings, Talbot Road, Port Talbot.—Last day for receiving proofs for dividend March 6th. Trustee, Mr L. S. Findlay, 35, Windsor Place, Cardiff.

A. E. Poole and H. Marsters (Poole's), electrical engineers, 33, Union Street, Wednesbury.—Last day for receiving proofs for dividend March 3rd. Trustee, Mr. F. E. Bendall, 3, Warwick Passage, Corporation Street, Birmingham.

R. A. Robinson (Highbury Engineering Works), radio and electrical engineer, 287, Upper Street, Islington, N.—Receiving order made February 17th on debtor's own petition. First meeting March 2nd and public examination April 7th, both at Bankruptcy Buildings, Carey Street, W.C.

W. S. Hart, electrician, 34, Arthur Street, Portsmouth.—Receiving order made February 18th on debtor's own petition. First meeting March 3rd at 87, High Street, Portsmouth. Public examination April 6th at the Court House, Portsmouth.

L. Haigh (Haigh & Co.), wireless and electrical dealer, 288, Keighley Road, Frizinghall, Bradford.—Trustee, Mr. F. H. Langmaid, 71, Manningham Lane, Bradford, Official Receiver, released February 14th.

G. A. Glazebrook (Coventry Electrical & Wireless Supplies), 27a, Victoria Street, Coventry.—Last day for receiving proofs for dividend March 7th. Trustee, Mr. C. J. Band, 9-11, High Street, Coventry, Official Receiver.

A. Harrison, electrical engineer and contractor, 110, Town Street, Horsforth, near Leeds.—Last day for receiving proofs for dividend March 6th. Trustee, Mr. H. C. Bowling, 24, Bond Street, Leeds, Official Receiver and trustee.

A. Marcus (Radio & Electric Store), 58, Beatty Avenue, Matthew Bank, Newcastle-upon-Tyne.—Last day for receiving proofs for dividend March 7th. Trustee, Mr. P. J. McLellan, 81, St. Mary's Place, Newcastle-upon-Tyne, Official Receiver.

Government Contracts

The following contracts were placed by various Government Departments during January :—

ADMIRALTY.

Motor alternator, control gear, &c.—Crompton Parkinson.
Batteries.—London Battery & Cable Co.; D.P. Battery Co.; Chloride Elecl. Storage Co.
Fuse boxes.—Brownlee & Co.
Branch breakers.—Whipp & Bourne.
Cable.—Johnson & Phillips.
W.t. coils.—Gambrells, Rowse & Snoaden; H. W. Sullivan; Johnson & Phillips; Marconi's; R.I., Ltd.
Portable electric drilling machines.—Consolidated Pneumatic Tool Co.
Heating elements.—Simplex Electric Co.
Fans.—Electro Dynamic Construction Co.; Mawdsleys; Small Electric Motors.
Electric generators.—W. H. Allen, Sons & Co.
Lamps, adaptors and switchboard.—Engg. & Lighting Equip. Co.
Lamps.—G.E.C.; Siemens Electric Lamps & Supplies; B.T.H.; Ediswan.
W.t. panels.—Marconi's.
W.t. power board.—G.E.C.; Small Electric Motors; Wm. McGeoch & Co.; Whipp & Bourne.
Electrical spares for cranes.—Babcock & Wilcox. Sub-contractors: Veritys for motor spares; Allen West & Co. for control gear spares.
W.t. transformers.—Foster Engg. Co.; English Electric Co.; Johnson & Phillips.

WAR OFFICE.

Jointing boxes.—Siemens Bros.
Electric and submarine cable.—Siemens Bros.; W. T. Glover & Co.; B.I. Cables; Standard Telephones; Connollys (Blackley); Macintosh Cable Co.; Kniveton Cable Works; G.E.C.
Carbons, &c.—G.E.C.
Portable secondary cells.—Pritchett & Gold and E.P.S. Co.
Electric furnace.—Wild Barfield Electric Furnace.
Generators.—Laurence, Scott & Electromotors.
Generating sets.—R. A. Lister & Co.; Ruston & Hornsby.
Switch cubicles.—Met.-Vick. Elecl. Co.
W.t. valves.—G.E.C.; Ediswan; Mullard.

AIR MINISTRY.

Accumulators.—Chloride Elecl. Storage Co.
Aerial adaptors.—Siemens Bros.
Adaptors, &c., and d.f. stations.—Marconi's.
Cable.—Hackbridge Cable Co.; Callender's Cable & Construction Co.
Condenser units.—Oliver Pell Control.
Electric fans and fusing units.—G.E.C.
Generators.—W. Mackie & Co.; Rotax, Ltd.
Lamps.—Plessey Co.; G.E.C.
Neutralising units.—Ferranti.
Metal rectifiers.—Westinghouse Brake & Signal Co.
Relay sets.—Automatic Electric Co.
Starters.—Rotax, Ltd.
Switchboards.—Ferguson Pailin.
Switches.—Cox Walker & Partners.
Testing equipment.—Baird & Tatlock (London).
Transmitters.—Gambrells, Rowse & Snoaden; Plessey Co.
Unions, plugs and sockets.—Siebe Gorman & Co.
Voltmeters.—Everett, Edgcumbe & Co.

POST OFFICE.

Telegraphic apparatus.—Power Equipment Co.
Telephonic apparatus.—Ediswan; G.E.C.; Plessey Co.; Siemens Bros.; Siemens Electric Lamps & Supplies; Standard Telephones; Telephone Mfg. Co.
Testing and protective apparatus.—Dynamo & Motor Repairs; Plessey Co.; Standard Fuse Co.; Standard Telephones; H. Tinsley & Co.; Walter's Electrical Mfg. Co.; Westinghouse Brake & Signal Co.
Wireless apparatus.—Ediswan; R.I., Ltd.
Terminal blocks.—H. E. Ashdown (Birmingham).
Cable.—B.I. Cables; G.E.C.; London Electric Wire Co. & Smiths; Macintosh Cable Co.; Siemens Bros.; Standard Telephones.
Secondary cells.—Accumulators of Woking (1928); Fuller Accumulator Co. (1926); Oldham & Son.
Telephone cords.—B.I. Cables; London Electric Wire Co. & Smiths; L.P.S. Electrical Co.; Phœnix Telephone & Electric Works; Reliance Electrical Wire Co.; Siemens Bros.; Standard Telephones.
Electric lighting fittings.—Hailwood & Ackroyd.
Electric lamps.—Ever Ready Co. (Gt. Britain).
Insulating tape.—Henley's.
Cabling and loading coils.—Birmingham-Nuneaton; Bangor-Beaumaris; Banbury-Stratford-on-Avon: United Telephone Cables. Truro-Falmouth-Helston: Pirelli-General Cable Works.
Co-axial cabling.—Faraday Building-Broadcasting House-Alexandra Palace (London): Standard Telephones.
Telephone exchange equipment.—Torquay; Manchester trunk; Kingston and Wood Street exchanges (London); Foxhall (Ipswich); Reigate: Automatic Electric Co. Sub-contractors for Reigate: Alton Battery Co. for batteries; Electric Construction Co. for motor generators and ringing machine. Highbury and Midland exchanges (Birmingham); Wellingborough: G.E.C. Sub-contractors for Highbury and Wellingborough: D.P. Battery Co. for batteries. Ryde (I. of W.); Welbeck (London); Rochdale; Ashford; Middlesex: Standard Telephones. Sheffield trunk; North, Rodney and Winchmore Hill (London): Siemens Bros. Sub-contractors for Winchmore Hill: Hart Accumulator Co. for batteries; Electric Construction Co. for motor generators and ringing machine. Gladstone (London).—Ericsson Telephones.
Telephonic repeater equipment.—Newcastle-upon-Tyne; Marks Tey: Standard Telephones. Exeter; Plymouth: Automatic Telephone & Electric Co. Sub-contractors for Exeter and Plymouth: National Gas Engine Co. for oil engines; Electric Construction Co. for generators.
Voice frequency telegraph equipment.—Liverpool; Birmingham; Hull; London new voice frequency terminal; Glasgow; Southend-on-Sea; Guildford; Tunbridge Wells; Ayr: Standard Telephones.

CROWN AGENTS FOR THE COLONIES.

Electric motors, &c., for converting cranes.—Vickers-Armstrongs.
Electric lighting and power installation and street lighting equipment.—G.E.C.
Meters, &c.—Siemens Electric Lamps & Supplies.
Mural boxes, &c., and cable.—Henley's.
Radio telephone terminal equipment, &c.—Marconi's.
Telephone cable.—Standard Telephones.
X-ray transformer, &c.—Schall & Son.

Electricity Supply

Lighting, Domestic, Power

Annesley (Notts).—STREET LIGHTING.—The Parish Council has completed a street-lighting agreement with the Derbyshire and Nottinghamshire Electric Power Co.

Bournemouth.—HEATING A SWIMMING BATH.—Having considered reports on various systems for heating the new public baths, the responsible committee has decided to obtain tenders for electrical thermal-storage plant.

Bradford.—FAILURE OF SUPPLY.—The supply of electricity to the whole of Bradford failed at 6.18 p.m. on Monday last. The origin of the fault is believed to have been the failure of an insulator on the main high-voltage switchgear at the Valley Road station, according to a statement by Mr. W. Dundas (deputy city electrical engineer) reported in the *Yorkshire Post*. The oil fire that followed continued until 10.30 p.m. and destroyed switchgear, cables and the switch-house building. The grid supply, which is said to have been sufficient to meet the needs of Bradford, could not be put into use in view of the purely local nature of the fault. The immediate value of the damage was estimated to be up to £50,000. Later reports indicated that supplies were available in the centre of the city and in private houses the following evening, but that power for industrial works and lighting in the residential outskirts was still curtailed.

Brighton.—PURCHASE OF SITE FOR POWER STATION EXTENSION.—The House of Commons has approved an Order in respect of the acquisition by the Corporation of the land necessary for extending the Southwick power station.

Croydon.—SUB-STATION.—The Electricity Committee is to equip a new sub-station at the South Norwood sewage works at a cost of £1,524.

NEW PLANT.—Sanction has been obtained by the Electricity Committee to loans of £7,000 for power station buildings and £23,205 for plant.

Edinburgh.—STREET-LIGHTING IMPROVEMENT SCHEME.—The Streets and Buildings Committee proposes to carry through a £51,000 scheme for improving the street lighting, both electric and gas. Lamps of increased wattage are to be provided in many cases and refractors fitted, while there are to be lighting extensions in new housing areas.

Exeter.—SUB-STATIONS.—Sanction to a loan of £7,500 for sub-stations has been obtained by the Electricity Committee.

Falkirk.—NEW EQUIPMENT.—A new sub-station is to be installed in the neighbourhood of Abbots Foundry, Bankside, and the existing e.h.v. cable extended from the Etna sub-station. The cost of the cable, sub-station and switchgear is estimated at £2,000.

Government House, Mandalay, floodlighted by G.E.C. projectors and decorated on the occasion of a fancy dress dance

Faversham.—NEED FOR FURTHER PLANT.—The electrical engineer recently reported that the output of the undertaking continued to increase rapidly. Additional plant should be installed not later than August next, he said. The Council instructed the surveyor and the engineer to prepare plans and estimates.

France.—1935 GENERATION FIGURES.—Statistics for electrical production in France during 1935, compiled by the Ministry of Public Works, indicate a fairly stationary situation. Total production figures are given as 11,061 million kWh for 1935, against 10,702 million kWh for 1934. The output of thermal plants declined from 4,215 million kWh in 1934 to 3,871 million kWh in 1935, while hydro-electric plants generated more (7,190 million kWh in 1935, against 6,487 million kWh in 1934).

HYDRO-ELECTRIC DEVELOPMENT.—A new hydro-electric power station with a capacity of 150,000 kVA, utilising the power of the Marèges falls on the Dordogne River in the Haut-Dordogne Department, was recently inaugurated by the French Ministry of Public Works. The output is intended for the operation of the trains on the Orléans Railway and for transmission at 220,000 V to the distribution system in the Paris area of the Union de l'Electricité. The work has included the construction of a curved dam 395 ft. high and 649 ft. wide across the sill. The generating plant comprises four 37,500-kVA vertical-shaft turbines coupled direct to generators developing 12,000 V power at 4,900 r.p.m., and two auxiliary sets of 3,200 kVA generating at 3,000 V at 500 r.p.m. Adjacent to the plant is a sub-station equipped with two 75,000-kVA transformers. A third 37,500-kVA transformer is designed for an output pressure of 90,000 V on the h.v. side.

Guildford.—RURAL SUPPLIES.—A comprehensive scheme for electricity supply in the Boxgrove, Merrow and Clandon districts is to be prepared.

Hove.—CHANGE-OVER.—Owing to the increased demand on the d.c. supply during hours of heavy load the Electricity Committee recommends that part of the system shall be changed over to a.c. at a cost of £1,482. Permission is also being sought for the whole of the d.c. system to be changed to a.c. as and when necessary.

Hungerford.—OVERHEAD LINES.—The Wessex Electricity Co. has informed the Rural District Council of its intention to proceed with the erection of overhead lines from Blandys Hill, Kintbury, to Inkpen Common and West Woodhay. An extension scheme to Lambourn is also planned.

Italy.—A LARGE HYDRO-ELECTRIC STATION.—In three recent issues of the *Revue Général d'Electricité* a description is given of the Carlo-Cicogna hydro-electric station, established on the River Isarco at Cardano, by the Societa Idroelettrica dell' Isarco. The water from the storage lake is conveyed to the station by a canal about 9¼ miles long and operates five sets of 45,000-h.p. vertical-shaft turbines and 10-kV generators, and three 14,700-h.p. sets generating power at 4-kV. For station power purposes there are two sets of 500-kVA, 500-V turbo-generators. At the outdoor transforming station the 10-kV power is stepped up to 226 kV for transmission to the 154 miles distant reception station of the Societa Lombarda per Distribuzione di Energia at Cislago, to the north-west of Milan. A 130-kV line about 34 miles long runs to a transforming station at Lavis for further transmission to the Porto Margherita system of the Societa Adriatica di Elettricita, of Venice. There is also a connection to the distribution system of the Societa Trentina del'Elettricita.

Kettering.—SWITCHGEAR.—The Electricity Department has been advised by the C.E.B. that the main 6,600-V switchboard at the station is subject to fault currents, and ten of the Council's panels and three belonging to the Board are to be modified, while three additional panels are to be installed.

LOAN.—Sanction has been received by the Electricity Department to the borrowing of £20,000 for mains.

London.—ELECTRICITY FOR TWO L.C.C. ESTATES.—Two big electrical installation schemes have been approved by the London County Council and will be carried into effect during the next three years. One relates to the Bellingham estate of 2,128 houses, which was developed between 1921 and 1929, gas lighting being installed. The Housing and Public Health Committee states that 1,300 residents have petitioned for electricity, and that the South Metropolitan Electric Light and Power Co., Ltd., is prepared to lay the necessary mains and services free of charge to the Council if it undertakes to wire the houses, on the understanding that the work will proceed in sections of 700 houses as and when 60 per cent. of the tenants have signified their wish for electrical installations. The Committee observes that there is little doubt that this percentage will be obtained. The preliminary estimate is £23,400, and £10,500 is included in the estimates for 1936-37. It is proposed to add between 2d. and 4d. to the weekly rentals of houses to cover the cost. The second scheme is at Downham, where it is proposed to spend up to £58,300 on installing electricity in 5,296 houses and flats in the Lewisham area, £21,500 being included in the estimates for 1936-37. The Council has come to a similar arrangement with the South Metropolitan Co. as in the case of the Bellingham houses. The tenants will be charged 3d. (houses) and 2d. (flats) weekly.

ELECTRICAL FACILITIES FOR FLATS.—A block of 120 flats which the Hackney Metropolitan Borough Council is to build at Casenove Road is to have features not hitherto provided on the Council's estates. There will be facilities for the use of electricity for all purposes, including heating and cooking. Electric wash-boilers will be installed, and these will also provide hot water for the baths. There will also be electric water-heaters for supplying hot water to the sinks. Power plugs will be provided in each living room and in each small bedroom where there is no fireplace.

BLACKHEATH LIGHTING.—The Works Committee of the Lewisham Borough Council is of opinion that the existing gas lighting in Blackheath Village and in Prince of Wales Road should be replaced by electric-discharge lighting. The change-over in Prince of Wales Road, which runs across Blackheath, will not, however, be put in hand until the Greenwich Council is in a position to deal with that portion of the road in its area in the same way.

ST. MARYLEBONE.—A special charge of ¼d. per kWh for floodlighting the towers of churches after 5.30 p.m. has been fixed by the Electricity Committee.

Mansfield.—TWO-PART TARIFF.—A two-part tariff of 15 per cent. on rateable value, with a minimum charge of £2 per annum, plus ¾d. per kWh is to be introduced by the Electricity Committee.

Oswaldtwistle.—FEWER FACTORY CHIMNEYS.—It is reported in the *Northern Daily Telegraph* that two further factory chimneys have been felled, making a reduction of sixteen

during the past eight years. This does not mean, however, that in every instance the factory to which the chimney was attached has ceased its activities. The increasing use of electricity as a means of driving machinery has been responsible in some cases, particularly where idle mills have been taken over by outside firms.

Portland.—STORAGE WATER HEATERS FOR HIRE.—It is recommended by the Electricity Committee that a range of thermal storage water heaters should be available for hire.

Rawtenstall.—METERS.—Sanction to a loan of £5,000 for meters is being sought by the Electricity Committee.

St. Austell.—INQUIRY.—Mr. F. G. Tucker held a Ministry of Health inquiry last week into the application by the St. Austell Electric Co., Ltd., for permission to use overhead lines on the sea-front road from Mevagissey to Portmellon. Mr. C. Culmer Hodges, manager and engineer, said that an alternative scheme to take the line at the back of houses would involve extra capital charges to the Council amounting to £125, and to individual consumers of £4 per house, Mr. G. B. Dobell (clerk to the Council), said that the Council had not objected to overhead lines before, because it had understood that as a result of giving consent to the company's application to carry the mains at the back of the houses it was the intention of the company to remove the mains from the Mevagissey-Portmellon Road. The poles and wires were in a road facing the sea, which was one of the beautiful views in the district, and were an eyesore to people living there. On its being intimated that it was not thought that the Council would be prepared to pay towards the cost of an alternative plan, the inspector said that the local authority objected to these overhead lines, and should be prepared to pay something towards an alternative. It was eventually decided that the Council should consider the question of contributing towards the extra cost, and the inspector withheld his report until he was acquainted with the decision.

Scalloway (Shetland).—STREET LIGHTING.—The streets of Scalloway, Shetland, are now lighted by electricity for the first time. The official switching-on ceremony was performed last week.

Sedgefield (Co. Durham).—Following complaints by the Parish Council regarding the electricity supply, the North-Eastern Electric Supply Co., Ltd., has announced that it intends to improve the system by changing the high-voltage line from Fishburn to Sedgefield from 3,000 V to 20,000 V. The work is to be undertaken in the summer.

Shipley.—INSTALLING ELECTRICITY.—The Electricity Committee is to prepare a scheme for electrical installations in forty-one houses in Victoria Road.

South Africa.—EXPANSION AT PRETORIA.—The sale of 600 additional electric refrigerators and 550 more electric stoves, the securing of 554 new consumers, and expansion in many other directions are among the achievements of the Pretoria Municipal Electric Supply Department recorded by the city electrical engineer, Mr. L. L. Horrell, in his annual report for 1934-35 year. The municipality received £258,047 in revenue from the department in the twelve months, an increase of 10.9 per cent. compared with the preceding year. The average price per kWh of electricity supplied dropped from 1.251d. in 1934 to 1.181d. in 1935. The total amount of electricity sold was 52,445,819 kWh, representing an increase of 7,832,506 kWh, or 17.5 per cent.

Sutton Coldfield.—STREET LIGHTING.—The Town Council is to carry out a scheme of electric street lighting in Jockey Road at an estimated cost of £400.

West Hartlepool.—EXTENSIONS.—The Town Council is to provide a supply of electricity to new workshops for the Expanded Metal Co. (£360) and to the new Majestic Cinema (£400).

ASSISTED WIRING.—The Town Council is to apply for sanction to borrow £5,000 in connection with its assisted wiring scheme.

Weston-super-Mare.—PETITION FOR ELECTRIC LIGHTING.—A petition for electric lighting signed by 205 tenants of houses on the Bourneville estate was placed before the Housing Committee recently. The Committee decided against incurring the expense of such a scheme, but intimated that no objection would be raised to the tenants changing over to electricity.

Worksop.—INQUIRY INTO INDUSTRIAL SCHEME.—On Wednesday and Thursday last week two of the Electricity Commissioners, Sir John Brooke (vice-chairman), who presided, and Mr. J. M. Kennedy, investigated an industrial scheme promoted by the Worksop Development Co. under which the company would take over the management of the Worksop electricity undertaking and erect a power station from which steam as well as electricity would be available at cheap rates to factories. Opposition was offered by the Central Electricity Board and the Derby & Notts Electric Power Co. It was stated that this was a test case and, if granted, similar schemes would be adopted in South Wales, the North-East Coast and other distressed areas. Mr. J. H. Thorpe, K.C., for the Development Company, said that in regard to the proposed erection of a generating station the Commissioners had to decide whether it was a public or a private station. The Development Company was the daughter of a larger company, the Town and Factories Development Co., incorporated in 1925. It was anticipated that the scheme would be complete in two years, the cost of the construction being £250,000. Mr. A. Monkhouse, engineer, said that in making tubes of steel, which were likely to be needed in large quantities in this country during the next few years, there was a certain alloy now only manufactured abroad. For this cheap electricity was essential. Certain persons were anxious to start the venture in England and had approached the Development Company.

Mr. S. Donkin, consulting engineer, said it was hoped that the first stage of the scheme would be realised by 1939, when three five-acre factories would be erected; the second stage would have ten five-acre factories. The Town Clerk (Mr. A. Norman Schofield) said it was known that two firms would start factories at Worksop, one to employ more than 500 persons in the manufacture of biscuits, and the other for canning peas grown in the district. A food-preserving factory would preserve produce grown in Lincolnshire and North Notts, and other factories contemplated were one for artificial silk weaving, to employ 400 people, and a clothing factory employing 70 people. Several inquiries had also been made direct to the company. He was convinced the bulk supply from the company to the Corporation would be much cheaper than the terms offered by the Central Electricity Board and the Derby and Notts Electric Power Co. The chairman closed the inquiry, intimating that the legal arguments would be heard in London at a date to be fixed.

The strip mills of Messrs. Arthur Lee & Sons, Sheffield. This is one of several photographs sent to us by the Metropolitan-Vickers Electrical Co. to illustrate industrial applications of the company's electric-discharge lamps

Traction

Denmark.—DIESEL-ELECTRIC TRAINS.—As a result of the success of the 1,100-h.p. streamlined "Lyntog" trains put into service last May the Danish State Railways have ordered four more diesel-electric trains of the same power, but with four cars instead of three. They will be used for the Copenhagen to Esbjerg boat trains, and will incorporate "Asea" electric transmission.

Doncaster.—RAILWAY STATION TO BE MODERNISED.—The L.N.E.R. station is to be rebuilt at a cost of £250,000. Colour-light signalling will be installed and the whole premises will be illuminated by electricity instead of by gas, as at present.

France.—ELECTRIC LOCOMOTIVE MILEAGE.—Since going into service in 1927 electric locomotives Nos. E.501 and E.502 of the Paris-Orléans Railway have covered an aggregate of 900,000 miles. These two locomotives were the 3,000-h.p. trial units built by Brown, Boveri & Oerlikon for the first main-line conversion scheme of the Paris-Orléans Railway. Two other locomotives of 4,000-h.p. each, which went into service in the summer of 1933, have covered an average individual mileage of 140,000.

Germany.—A HIGH-SPEED DIESEL ELECTRIC TRAIN.—It is reported that a new type of diesel-electric train reached a speed of 127.36 miles per hour during a trial run from Hamburg to Berlin. This is claimed to be a world's record. The train will probably be put into service between Berlin and Breslau.

Irish Free State.—NEW DIESEL-ELECTRIC LOCOMOTIVE.—A diesel-electric passenger locomotive of 500 b.h.p. has been ordered from Harland & Wolff, Ltd., by the Belfast & County Down Railway for service on the Ardglass branch. It will have four nose-suspended traction motors and will weigh about 46 tons.

Leeds.—L.N.E.R. IMPROVEMENTS.—Work on the resignalling of Leeds New Station is well advanced. Colour-light searchlight signals and electro-pneumatic points will replace manual control. The signals consist of a single lamp behind a moving vane containing coloured glass, the position of the vane controlling the signal given to the driver. The complete operation of the electro-pneumatic points, including locking and checking, takes only 1¼ sec. Air compressed to 60 lb. per square inch is the motive force.

Liverpool.—NEW TRAMS.—The Passenger Transport Committee proposes to construct 125 new tramcars of the bogie type at a cost of £2,500 each.

London.—KING'S CROSS UNDERGROUND STATION BEING REBUILT.—The London Passenger Transport Board has begun the work of rebuilding King's Cross station, which serves the Metropolitan, Piccadilly, and Morden-Edgware lines. The first contract provides for a central ticket hall similar to that

E.D.A. personalities, including Messrs. P. J. Robinson, A. C. Cramb and V. W. Dale, embarking from the Association's stand for a tour of the British Industries Fair, Castle Bromwich, on a Morrison electric vehicle

at the Leicester Square station. Escalators will lead direct from the hall to the platforms of the Piccadilly and Morden-Edgware lines. This hall will replace three ticket halls and an involved subterranean interchange. The existing subway entrances from the neighbouring street corners and from the two main line stations (St. Pancras and King's Cross) will be retained. Three flights of fast moving escalators will carry passengers to and from both the Piccadilly line platforms. Two flights of three escalators each will lead from the Piccadilly line platforms to the Morden-Edgware line. Lifts will be eliminated, and the movement of traffic will be aided further by automatic ticket machines. The cost of rebuilding the tube station will be more than £300,000. This work comes under the five-year programme of reorganising and expanding the London transport system at a cost of £40,000,000. The final plans provide for improved interchange between the main line station at King's Cross (London & North Eastern Railway) and St. Pancras (London, Midland & Scottish Railway) and the Metropolitan, Piccadilly and Morden-Edgware lines.

Manchester.—NO ELECTRIC LINE TO WYTHENSHAWE.—The railway companies, it is stated, have not received favourably the proposals put forward by the Corporation for the construction of an electric railway between Wythenshawe and Manchester. The companies state that the Wilmslow and Altrincham lines, with which the new line would connect, are already congested, and that in any case they could not compete with the existing bus service.

Newcastle-on-Tyne.—TRANSPORT BOARD PROPOSED.—A suggestion that a Passenger Transport Board, similar to the London Passenger Transport Board, should be set up to control all the Tyneside road services and local railways was made at Newcastle on February 21st during the hearing of evidence by the Royal Commission for the Unification of Tyneside Local Authorities. The suggestion was made by Mr. T. P. Easton (transport manager to Newcastle City Council) and endorsed by Ald. Richard Mayne (chairman, Newcastle City Transport and Electricity Committee). Ald. Mayne said the City Council operated 92 miles of single track tramways, 110 miles of omnibus services, and a short trolley-bus route. The Council had spent £2,300,000 on its transport services, and he contended that it was entitled to a monopoly in the city area. This, he explained, was agreed to by the Northern Traffic Commissioners, who had fixed protective fares to safeguard the trams and buses. Mr. T. P. Easton said Newcastle was the only municipal transport authority on the north bank of the Tyne and South Shields the only one on the south side. There were eighteen private operators running services into Newcastle. He suggested the formation of a Transport Board to cover all passenger services on the north as far as Blyth and the south as far as Sunderland. This would eliminate competition and bring about standardisation of wages. The Northern Traffic Commissioners had done a lot to bring order to transport in the area, but they were hampered by not having control over the railways. Mr. Easton said that the Newcastle City Council had started a short trolley-bus service, and he thought that eventually trolley-buses would operate throughout the city.

Poland.—WARSAW SUBURBAN ELECTRIFICATION.—Work is proceeding on the electrification of all the railway lines in Warsaw and its immediate suburbs, including those to Zyrardow (on the route to Cracow), Otwock (in the direction of Deblin), and Minsk Mazowiecki (towards Siedlce). Altogether 236 kilometres of single track is to be electrified. The trains will be fed through a trolley wire suspended at a height above the rails adjustable between limits of 6.2 metres and 4.55 metres, the general height being 5.6 metres. The system will operate at 3,000 V d.c., the supply being received from the 35,000 V a.c. mains *via* six automatic auxiliary substations. The rolling stock is to be of the most modern construction in welded steel, the train sets each comprising a motor coach and two carriages. Automatic coupling is to be provided, while the doors will be controlled by electro-pneumatic mechanism. It is expected that the trains will have a commercial speed of 50 km.p.h. (about 31 m.p.h.).

Russia.—MORE ELECTRIFIED LINES.—The work of electrifying a branch line between Apatity and Kandalalsha, a distance of about nine miles, on the railway between Leningrad and Murmansk has recently been completed. Another electric line is to be built in the same district between Kirovsk and Murmansk, the construction to be commenced in April.

Communications

France.—INTERNATIONAL BROADCASTING CONFERENCE.—The International Union of Radiodiffusion, which includes all State and private broadcasting companies in Europe, has been meeting in Paris during the past week. The principal items on the agenda were the suppression of interference between stations, and the elimination of causes of defective reception. The chairman, M. Pellenc, head of the French broadcasting organisation, stated that progress in France had been so marked under the guidance of M. Mandel, Minister of Posts and Telegraphs, that in less than a year the number of French listeners-in had increased by 50 per cent.—*Reuter* (Paris).

TELEVISION AT POST OFFICES.—M. Mandel has arranged for a thirty-minute television transmission each day states an *Exchange* message. The public will be able to view the transmissions at post offices by buying a card of admission.

Great Britain.—TELEPHONE REDUCTIONS.—Speaking at a luncheon of the National Chamber of Trade recently, Major G. C. Tryon (P.M.G.) intimated that in the spring he might be able to make a further concession to telephone subscribers by reducing the maximum day rate to 2s. 6d. for a three-minute call to any part of the mainland of Britain. He also mentioned that towards the end of last year the number of telephones in use passed the 2,500,000 mark, and that during the year the public put through 1,755,000,000 local calls and 95,000,000 inland trunk calls.

India.—TELEGRAPH AND TELEPHONE PROGRESS.—According to the latest report of the Indian Posts and Telegraphs Department, 300 additional miles of lines carrying 7,400 miles of wire, and twenty miles of cable containing 3,800 miles of conductors, were put into service during 1934-35. Telephone expansion was chiefly in trunk facilities, and there are now lines connecting most of the principal towns in India, while the service has also been extended to Ceylon. A radio-telephone circuit between India and England was opened for public service in 1933, and has gradually been extended to most countries in Europe and to other parts of the world with which communication with London is possible.

MORE RADIO LICENCES.—The number of broadcast receiving licences issued during 1934-35 was 18,000, against 12,000 in the previous year. Since January, 1934, licences have been required only for the importation of transmitting apparatus, and thirty-three licences were issued for this purpose during the year, as compared with 695 in the previous year, when licences were required to cover the importation of any kind of apparatus.

FURTHER EXTENSION OF TRUNK TELEPHONE FACILITIES.—The Government has allocated a considerable sum of money to the extension of trunk telephone facilities. The plan embraces the expansion of existing facilities to meet the growing traffic and the opening up of new trunk exchanges. The provision of radio stations to serve the interests of civil aviation is also included in the expenditure for the next budget year.

Lithuania.—TELEPHONES.—According to a recently issued D.O.T. report, automatic telephones have recently been installed at Klaipeda, and the Kaunas exchange will be completed this year.

WIRELESS LICENCES.—In 1934 20,000 radio sets were registered. This represents only 8.2 sets per thousand inhabitants, although in the city of Kaunas the proportion was 37.7 and in Klaipeda 73.5 per thousand.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdeen.—March 10th. C.C. Education Committee. Electric lighting of Strichen Junior School. E. L. Williamson, architect, 154, Union Street.

Aberystwyth.—March 13th. Electricity Department. One 520-kW Diesel d.c. generating set and d.c. switchboard and cable connections. (February 21st.)

Aldershot.—March 3rd. Corporation. Electric clocks for Aldershot Park Schools. (February 21st.)

Bath.—March 11th. Corporation. Electrical materials for one year. (See this issue.)

Birmingham.—March 6th. Electric Supply Committee. Replating one 2,000-Ah battery and cleaning out one 6,000-Ah battery. City electrical engineer, 14, Dale End (deposit £2).

Bridport.—March 23rd. Electricity Department. Overhead lines and air-break switchgear. (See this issue.)

Brighton.—March 9th. Electricity Department. Cables for one year. (See this issue.)

Bromley (KENT).—March 12th. Electricity Department. Transformers. (See this issue.)

Bury.—March 12th. Electricity Department. Cables for one year. (See this issue.)

Cheadle and Gatley.—March 13th. Electricity Department. Extension to existing 6.6-kV switchgear. (See this issue.)

Cleethorpes.—March 9th. U.D.C. Transformer, cable, switchgear and main stores. (See this issue.)

Clitheroe.—March 14th. Electricity Department. Cables and meters for one year. (See this issue.)

Edinburgh.—March 12th. Electricity Department. Materials for one year. (February 21st.)

Exeter.—March 6th. Electricity Department. Service cut-outs and link disconnecting boxes for one year. (See this issue.)

Farnworth.—March 9th. Electricity Department. Electrical supplies for one year. (See this issue.)

Fife.—March 3rd. Fife and Kinross Joint Sanatorium Board. Electrical and heating works at new children's block, Glenlomond Sanatorium. C. R. Douglas & Son, Prudential Buildings, East Port, Dunfermline (deposit £1 1s.).

Great Crosby.—March 7th. U.D.C. Electric lamps for the year ending March 31st, 1937. J. A. Wright, surveyor, Town Hall.

Heywood.—March 4th. Corporation. Cables. (February 21st.)

Horsham.—March 11th. Electricity Department. Two steel kiosk sub-stations and two 300-kVA transformers. (See this issue.)

Hull.—March 5th. Maternity and Children's Sub-Committee. Electric lighting, heating, water heating and bell installation to the extension of the administration block of the Municipal Maternity Home, Hedon Road. City Architect's Department, Guildhall (deposit £1 1s,).

Ilford.—March 6th. Electricity Department. Transformers. (See this issue.)

India.—March 10th. Bengal and North Western Railway Co., Ltd. Tungsten filament lamps. (See this issue.)

SIMLA.—April 21st. Stores Department. Wall plugs, ceiling roses, &c., required during the period from July 1st, 1936, to June 30th, 1937. (T.Y. 10402.)*

Kearsley.—March 7th. U.D.C. Electric lamps for the year ending March 31st, 1937. J. F. Moyse, Council Offices.

Leyton.—March 9th. Electricity Department. Cables for one year. (February 21st.)

Littleborough.—March 7th. Electricity Department. Cables and meters for one year. (February 21st.)

London.—BETHNAL GREEN.—March 6th. Borough Council. Meters and cables. (February 21st.)

GREENWICH.—March 4th. Borough Council. Electric wiring installations on housing estate. (February 21st.)

HACKNEY.—March 16th. Borough Council. Electrical installation for a block of flats. (See this issue.)

Lymm.—March 16th. U.D.C. Two small underground sub-pumping stations comprising unchokeable centrifugal pumps, electric motors, switchgear, &c. C. J. Lomax & Son, 37, Cross Street, Manchester, 2 (deposit £1 1s.).

Manchester.—March 10th. Electricity Committee. (A) 33-kV three-phase a.c. switchgear for the Stuart Street (Bradford) and Ellen Street (Droylsden) sub-stations. (B) Supervisory control gear for the Failsworth and Sale sub-stations. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall (deposit £1 1s. each).

Neath.—March 12th. Electrical Engineer's Department. Electrical overhead line, service material and electric lamps for the year ending March 31st, 1937. G. H. Thomson, electrical engineer, Council Offices, Orchard Street.

Newark-on-Trent.—March 31st. Electricity Department. Transformers, kiosk and switchboards. (See this issue.)

Northern Ireland.—BELFAST.—March 13th. Electricity Department. Ventilating and air filtering plant for the head office. (See this issue.)

April 3rd. Steam boiler plant and auxiliaries. (See this issue.)

Portland.—March 9th. Electricity Department. Cables, meters, cookers, kettles, &c., for one year. (February 21st.)

Prestwich.—March 2nd. U.D.C. Electric street lighting fittings and lamps during the year ending March 31st, 1937. Handel Kay, engineer and surveyor, Town Hall.

Reigate.—March 14th. Electricity Department. Electrical materials for one year. (See this issue.)

Rhondda.—March 28th. Electricity Department. Meters and copper wire and house service material for one year. (February 21st.)

Rochdale.—March 16th. Electricity Department. 33-kV sub-station equipments and 33-kV switchgear extension at Dane Street power station. (February 21st.)

Salford.—March 12th. Corporation. One 12,500-kVA transformer. (See this issue.)

Sheffield.—March 9th. Electricity Department. Transformers. (February 21st.)

March 12th. Transformers. (See this issue.)

South Africa.—CAPE TOWN.—March 25th. Electricity Department. Ironclad service cut-outs (T.Y.10393).*

PRETORIA.—March 27th. Union Tender and Supplies Board. Switchboard cords. (T.Y.10392).*

BLOEMFONTEIN.—April 6th. City Council. Turbo-alternator condenser unit with coupling transformers, switchgear, cables, &c. (T.Y. 10401.)*

Stoke-on-Trent.—March 11th. Electrical Engineer's Department. Motors, meters and overhead lines for one year. (See this issue.)

Wallasey.—March 23rd. Electricity Department. Switchgear, transformers and cables. (February 21st.)

Walsall.—March 2nd. Electric Supply Department. Distribution accessories and transformers. (February 21st.)

Weymouth and Melcombe Regis.—March 16th. Electricity Department. 11,000-V cable and transformer kiosk with e.h.p. and l.p. switchgear. (See this issue.)

Workington.—March 16th. Electricity Department. Electrical materials for one year. (See this issue.)

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 36, Old Queen Street, London, S.W.1.

Contracts Closed

Ayrshire.—County Council. Accepted. Electrical work in seventy-two houses at Drumley.—D. A. McLarty & Co. Electrical work at the new police station at Beith.—W. Findlay Nelson.

Barnes.—Town Council. Accepted. 400 yd. of cable (£317) —Hackbridge Cable Co., Ltd.

Dundee.—Town Council. Accepted. Electrical work at fifty-six houses in Wolseley Street.—D. J. Macdonald.

Glasgow.—Electricity Committee. Accepted. Transformers: Twelve 300-kVA—Bruce Peebles & Co., Ltd.; six 300-kVA.—Brush Electrical Engineering Co., Ltd.; eight 400-kVA.—British Electric Transformer Co., Ltd.

Housing Committee. Accepted. Electrical installations and lamps in thirty-nine houses at Landressy Street (£171).—D. Henderson.

Transport Committee. Accepted. L.c. telephone and test cable.—Standard Telephones & Cables, Ltd. Dial recorders.—International Time Recording Co., Ltd.

Great Yarmouth.—Electricity Committee. Accepted. Transformer kiosks for twelve months.—Standard Switchgear, Ltd.

London.—BERMONDSEY. — Electricity Committee. Recommended. Rectifier plant for Minto Street sub-station (£3,175).—Hewittic Electric Co. Switchboard panel (£158).—Crompton Parkinson, Ltd.

HACKNEY.—Electricity Committee. Recommended. Extension of existing contracts for meters and demand indicators for a further twelve months to March 31st, 1937.—Measurement, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.; Ferranti, Ltd.; Landis & Gyr, Ltd.; Aron Electricity Meters, Ltd.; Chamberlain & Hookham, Ltd.; Reason Manufacturing Co., Ltd.

METROPOLITAN WATER BOARD.—Accepted. Switchboard for Hammersmith pumping station (£429).—General Electric Co., Ltd. Electrically driven pumps and automatic switchgear for Putney works.—

	£
Mather & Platt, Ltd.	1,405
	1,852
G. C. Pillinger & Co., Ltd. Recommended ...	**1,410**
Gwynnes Pumps, Ltd.	1,415
Harland Engineering Co., Ltd.	1,566
Pulsometer Engineering Co., Ltd.	1,860
Worthington-Simpson, Ltd.	1,910
W. H. Allen, Sons & Co., Ltd.	1,955

WANDSWORTH.—Borough Council. Accepted. Twenty-eight electrically illuminated bollards (£230).—Yorkshire Switchgear & Engineering Co., Ltd.

STOKE NEWINGTON.—Electricity Committee. Recommended. Electrical installations at the Home for the Aged, Sick and Poor, Manor Road (£321).—W. B. & H. C. Cables, Ltd. Conversion of electric motors and provision of protective gear for starters and switchgear for lighting at premises in Church Walk (£112).—Norvall Bros., Ltd.

HAMMERSMITH. — Electricity Committee. Recommended. Switchgear for the Elms House site and replacement of exist-

ing switchgear at the main intake and extension sub-stations at Cadby Hall (£3,853).—Ferguson, Pailin, Ltd.

L.C.C.—Accepted. Wiring and fittings for electric lighting, &c., in block 25 of dwellings on the East Dulwich estate (£475).—R. Gibbons & Co. This was the lowest of eight tenders, the highest being £812. Wiring and fittings for an automatic telephone system at the Maudsley Hospital (£1,480).—W. J. Furse & Co. (London), Ltd. This was the lowest of nine tenders, the highest being £1,976.

Electric wiring and heating at Credon Road school, Camberwell :—

	£
Francis Polden & Co., Ltd. Accepted	**1,189**
Pinching & Walton	1,284
G. E. Taylor & Co.	1,336
Bell Bros. & Co. (London), Ltd.	1,351
Collins Electrical, Ltd.	1,376
A. Meckhonik	1,495
J. Hunter & Co.	1,511
Jacob White & Co., Ltd.	1,776
Holliday, Hall & Stinson, Ltd.	2,260
Ryland's Electrical Co., Ltd.	2,489

Wiring and fittings for electric lighting and power at schools : Cooper's Lane, Lewisham :—

	£
Buchanan & Curwen, Ltd. Accepted	**831**
A. Hawkins & Sons	895
Pinching & Walton	895
L. G. Tate & Co., Ltd.	942
South Metropolitan Electric Light & Power Co., Ltd.	949
Anderson Angell & Co., Ltd.	963
G. W. Taylor & Co.	964
City Electrical Co.	1,013
Houchin, Ltd.	1,052
Barrett & Wright, Ltd.	1,321
Ryland's Electrical Co., Ltd.	1,723
E. C. Stokes, Ltd.	1,724

Kennington Oval :—

	£
Buchanan & Curwen, Ltd. Accepted	**758**
Electrical Installations, Ltd.	783
H. J. Cash & Co., Ltd.	789
W. H. Gaze & Sons, Ltd.	792
E. C. Champion	932
J. L. Shadwell	956
Read & Partners, Ltd.	980
City Electrical Co.	1,008
Coleley & Co., Ltd.	1,021
Collins Electrical, Ltd.	1,111
G. P. Wallis & Sons, Ltd.	1,142
E. Beckwith & Co., Ltd.	1,264

Middlesbrough.—Town Council. Accepted. 3,370 yd. of electric cable (£1,415).—Macintosh Cable Co., Ltd.

Torquay.—Town Council. Accepted. Electrically driven centrifugal booster pump (104,000 gal. per hr.).—W. H. Allen, Sons & Co., Ltd.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, March 5th. Institution, London. 6 p.m. "The High-pressure Mercury-vapour Lamp in Public Lighting." Messrs. G. H. Wilson, J. M. Waldram and Lt.-Cmmdr. E. L. Damant.

North Midland Centre.—Tuesday, March 3rd. Hotel Metropole, Leeds. 7 p.m. "Routine Over-Voltage Testing of High-Voltage Cables." Mr. C. Kibblewhite. Friday, March 6th. Hotel Metropole, Leeds. 7 for 7.30 p.m. Annual dinner.

North-Eastern Centre.—Wednesday, March 4th. The Literary and Philosophical Society, Newcastle-upon-Tyne. 7 p.m. Faraday Lecture, "Television—An Outline." Dr. E. Mallett.

Wireless Section.—Wednesday, March 4th. Institution, London. 6 p.m. "Fluorescent Screens for Cathode-Ray Tubes for Television and Other Purposes." Messrs. L. Levy and D. W. West. "The Comparative Performance of Gas-Focused and Electron-Lens-Focused Oscillographs at Very High Frequencies." Mr. L. S. Piggott.

Meter and Instrument Section.—Friday, March 6th. Institution, London. 7 p.m. "The Selenium Iron Photo-Rectifier Cell." Prof. J. T. McGregor-Morris and Mr. R. M. Billington. "The Selenium Rectifier Photo-Cell." Mr. J. S. Preston.

Diesel Engine Users' Association.—Friday, February 28th. Caxton Hall, London, S.W.1. 3 p.m. Report of the Committee on Heavy-oil Engine Working Costs (1934-35).

Electrical Industries Benevolent Association (*Tees-Side Branch*).—Friday, February 28th. Annual ball.

Electrical Power Engineers' Association (*London Local Group*).—Saturday, February 29th. Napoleon Restaurant, London S.W.1. Annual dinner and dance. Monday, March 2nd. Caxton Hall, London, S.W.1. 7.15 p.m. "Rising Mains in Large Buildings." Mr. R. W. Keene. (*Kent Section*).—Saturday March 7th. Royal Star Hotel, Maidstone. Annual dinner and dance.

University College of Swansea.—Wednesday, March 4th. University College, Swansea. 3 p.m. Welding Exhibition. 7.30 p.m. Conference and discussion on welding. To be opened by Prof. F. C. Lea.

Electrical Wholesalers' Federation.—Thursday, March 5th. Savoy Hotel, London, W.C.2. 6.30 for 7 p.m. Annual dinner.

Birmingham Electric Club.—Friday, March 6th. Grand Hotel, Birmingham. Annual dinner.

Physical Society.—Friday, March 6th. Imperial College of Science and Technology, London, S.W.7. 5 p.m. Short papers.

Royal Institution.—Friday, March 6th. Institution, London, W.1. "The Electric Properties of Crystals." Sir Wm. Bragg.

Belfast Association of Engineers.—Saturday, March 7th. Carlton Hall, Belfast. 6 for 6.30 p.m. Annual dinner.

Association of Mining Electrical Engineers (*South Wales Branch*).—Saturday, March 7th. Park Hotel, Cardiff. 7 p.m. Annual dinner.

Notes

The I.E.E. Summer Meeting

The summer meeting of the Institution of Electrical Engineers is to be held in Glasgow and the West of Scotland from June 15th to 20th. The programme, as provisionally arranged by the Scottish Local Centre Committee, is as follows :—

Monday, June 15th.—Assemble in Glasgow for evening reception and dancing at the Central Station Hotel.

Tuesday, June 16th.—Whole day visit to the Galloway water-power scheme; by train to Dalmellington and motor coaches to Tongland.

Wednesday, June 17th.—Morning tour of Renfrew works of Messrs. Babcock & Wilcox, Ltd., followed by extended steamer cruise on the Firth of Clyde.

Thursday, June 18th.—Morning alternative visits to the Alloa works of the Harland Engineering Co., Ltd., or the Scotstoun shipyard of Messrs. Yarrow & Co., Ltd., the East Kilbride works of Mavor & Coulson, Ltd., the new stores of Lewis, Ltd., in Glasgow, or the Clyde's Mill power station of the Clyde Valley Electrical Power Co. In the afternoon the whole party will proceed from Glasgow by motor coaches, *via* Lochs Lomond and Awe and the Pass of Brander, to Oban for the night.

Friday, June 19th.—By special train from Oban for Ballachulish; thence by motor coaches, *via* Kinlochleven, Loch Linnhe, Fort William and Loch Laggan, for a picnic luncheon and inspection of the water power dams of the British Aluminium Co., Ltd. In the afternoon the excursion will be continued by motor coaches, *via* the Pass of Glencoe, to Callander for the night. The meeting will terminate the next day.

The Electrical Association for Women

Responding to the toast of "The Association" at the annual meeting and luncheon of the Cardiff and District Branch of the Electrical Association for Women held last Friday at the Royal Hotel, Cardiff, Mrs. Pender Chalmers, vice-president, gave a brief outline of the drudgery that the housewife could avoid by using electricity in the home, and added that atmospheric pollution could be largely eliminated by members insisting on a reduction in electricity charges. Other speakers were Mrs. A. C. McWhirter, Mr. Edward Jones (Cardiff city electrical engineer), Mr. S. B. Haslam and Mrs. V. Jolliffe. Mrs. A. C. McWhirter was decorated with a chairman's badge of office, presented to the association by her husband, and replicas of the badge were given to the three past chairmen of the branch, Mrs. C. G. Morley New, Mrs. C. T. Allan and Mrs. S. B. Haslam, the last-mentioned lady also receiving the gift of a dressing-table set from the members to mark her year of office. At the meeting which preceded the luncheon the following officers were elected for 1936-37 :—Chairman, Mrs. A. C. McWhirter; vice-chairman, Mrs. David Ross; secretary, Mrs. A. Lindsay; assistant secretary, Miss J. Williams; and treasurer, Mrs. A. H. Dinham.

Mr. C. I. Shuttleworth, Hull deputy electrical engineer, lectured to members of the Hull and East Riding Branch on February 11th on "The Evolution of the Electric Lamp." On February 19th a visit was made to the Insular Electric Glow Lamp Works, Ltd.

Finsbury Old Students' Dinner

The Finsbury Technical College Old Students Association's annual dinner will be held at the Trocadero Restaurant on March 21st. Ladies are invited, and tickets (11s. 6d. each) are obtainable from Mr. F. R. C. Rouse, hon. sec., 15, Clifton Gardens, Golders Green, London, N.W.11.

Faraday House Dance

The Hotel Great Central, N.W.1, was again the rendezvous for the members of the Faraday House Old Students' Association on the occasion of their annual dance last Friday. The function was well attended, much of the credit for the success of the evening being due to the efforts of the Rev. L. Van Vestraut, who is honorary secretary of the Association. Among those present was Mr. H. W. Swann, the new President.

Yorkshire Television Association

The first annual dinner of the Yorkshire Television Association will be held on Monday next at Victory Hotel, Leeds, at 7.15 p.m., when the chief guest will be Mr. J. L. Baird.

Appointments Vacant

Senior accounts clerk for Winchester Electricity Department.

Consumers engineer for Colwyn Bay Electricity Department.

Lady showroom demonstrator for Worksop Electricity Department.

Assistant examiners in the Patent Office.

(See our classified advertisements.)

Courses for Engineering Teachers

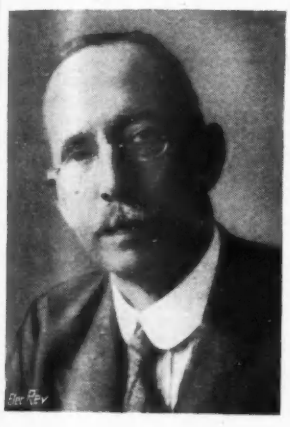
The Board of Education has issued a circular containing information concerning short courses for teachers of engineering subjects, including electrical engineering, which are to be conducted by Mr. H. J. Shelley, H.M. Inspector of Technical Schools, at New College, Oxford, from July 25th to August 5th. The inclusive charge for board, lodging and attendance for eleven days at Oxford will be £6 and travelling expenses may, in part, be defrayed by the Board. Application for admission should be made to the Board of Education on form 106U(T) before March 31st.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

It is officially announced that, owing to ill-health, **Sir William Ray,** M.P., has resigned his position as Executive Director of the British Electrical Development Association. It will be remembered that in July last year the Council of the Association granted Sir William three months' leave of absence on medical grounds. In October a notice appeared in the Press stating that he was "shortly" resigning, but the report lacked confirmation. An article bearing on his appointment (at £5,000 per annum) appeared in the ELECTRICAL REVIEW of November 3rd, 1933, at which date it was understood that Sir William would not be able to devote his whole time to the service of E.D.A. until the following March (1934). In the earlier period of his term of office he attended many electrical functions in different parts of the country, but last summer he was obviously unwell, and the present announcement does not come as a surprise.

Mr. E. J. Jennings, F.C.I.S., Companion I.E.E., who has held the position of secretary and commercial manager of the Birmingham electricity supply undertaking for the past eighteen years, is retiring from the service of the Corporation at the end of March on superannuation. Mr. Jennings, who is well known in the industry, has been prominently identified with the British Industries Fair at Castle Bromwich for some years past, and his interest in the National Convention and other questions is common knowledge. He will continue to hold office as secretary of the S.W. Midlands Advisory Joint Committee, established in 1923 under the provisions of the Electricity (Supply) Act, 1919; this was the first authority of its kind to be set up under the Act. It is satisfactory to know that his experience on the commercial side of electricity supply, extending over a period of forty-four years, will still be available to the industry. Mr. Jennings's address will continue to be 14, Dale End, Birmingham.



[*Lafayette*
Mr. E. J. Jennings

Mr. R. W. Kington, of Mollington, has been recommended by the Chester Corporation Electricity Committee for the appointment of assistant mains engineer at a salary of £316 per annum.

The appointment of **Mr. Samuel Insull** as president of the Affiliated Broadcasting Company, which operates a chain of small broadcasting stations in the Middle West, is confirmed by Press despatches from Chicago.

Mr. A. Monkhouse, who, it will be recalled, spent a considerable period in Moscow as the chief representative of the Metropolitan-Vickers Electrical Co., Ltd., stated last week, at an inquiry into an industrial development scheme at Worksop, that his company had granted him special leave to give evidence, and that he had been offered the position of chief engineer by the Town and Factories Development Co. The inquiry is reported on page 329.

[*Elec. Rev. photo*
Mr. A. Monkhouse

Mr. C. R. Westlake, A.M.I.E.E., who has resigned the position of chief engineer and manager of the Electricity Board for Northern Ireland, to take up the position of electrical engineer and manager to the Finchley electricity undertaking, was entertained to a farewell luncheon at the Grand Central Hotel, Belfast, on February 19th. Mr. F. H. Whysall, the city electrical engineer, Belfast, who presided, wished him success in his new sphere. Mr. Westlake, in reply, said that the Board had set out to extend service to the widest possible area, and to support firms and manufacturers who maintained offices in Northern Ireland among the community whom the Board served. Tributes were also paid to Mr. Westlake by Messrs. R. V. M'Crory, R. A. Boyton, F. R. Unwin, A. Scott, and N. W. Kidd.

A social function was held earlier in the week at which Mr. Westlake was presented with a walnut writing desk and leather writing armchair, and also a walnut bureau for Mrs. Westlake, from the staff of the Electricity Board.

Miss Haslett shows the growth in the number of electricity consumers to the Dowager Lady Swaythling at E.D.A.'s kiosk at the British Industries Fair, Birmingham

Mr. F. J. Child has retired after thirty-seven years' service on the staff of the Canterbury City Electricity Department, and he has been presented by his colleagues with a clock.

Mr. H. E. Annett was elected chairman of the North-West England and North Wales Area of the British Electrical Development Association at the annual meeting.

Mr. H. Cleave, whose appointment as mechanical maintenance engineer at the new Fulham power station was recorded in our last issue, was at one time general *engineer* with Messrs. Nasmyth, Wilson & Co., and not general manager as stated.

Mr. E. W. Tole was re-elected chairman of the S.W. England and South Wales Branch of E.D.A. at the annual meeting.

Mr. T. E. Thomas, manager of the London Passenger Transport Board's tramway and trolley-bus services, has been placed in charge of all the Board's road services, with the title of general manager, road transport.

Obituary

Mr. T. J. Walls.—The death is announced of Mr. Thomas J. Walls, founder of the firm of Messrs. Walls, Ltd., opticians, Forrest Road, Edinburgh. It is nearly fifty years since Mr. Walls set up in business as an optician and scientific-instrument maker. He was one of the earliest manufacturers of X-ray and cinematograph apparatus.

Mr. Henry R. Morton, a well-known figure in the electrical industry on the North-East Coast, died at Jesmond, Newcastle-on-Tyne, on February 19th, aged fifty-five. He entered the service of Messrs. Hugh Wood & Co., Newcastle, as an electrical engineer, and was at one time with Messrs. W. T. Glover & Co., Ltd. One of his chief interests was the use of electricity in mines and coal-cleaning plants.

Wills.—Mr. F. J. Kitson, joint deputy-chairman of the Yorkshire Electric Power Co., and director of the Yorkshire Waste Heat Co., left £115,325, with net personalty £114,125.

Lord Vaux of Harrowden, member of the Council of the British Electrical Federation, and a director of the Brush Electrical Engineering Co., Ltd., and some of the associated companies of the British Electric Traction Co., Ltd., left £136,729 (net personalty £90,268).

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

APOLLO fires.
PURIT domestic appliances.
British makers of a full-size electric trouser press.
PLEXUM vacuum cleaners.
British makers of electric hedge cutters.

Readers should enclose stamped addressed envelopes when making their inquiries.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Shaftesbury Microphones, Ltd.—Private company. Registered February 20th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a manufacturer of radio and public address equipment carried on by Norman Rose. The directors are: N. S. Rose and J. A. Orr Ewing, both of 24, Aldersgate Street, E.C.1. The directors' borrowing powers are restricted to £10,000. Registered office: 24, Aldersgate Street, E.C.

Quartz Crystal Co., Ltd.—Private company. Registered February 17th. Capital, £100 in £1 shares. Objects: To acquire the business carried on at 63, Kingston Road, New Malden, by E. A. Dedman and N. H. R. Munday as the Quartz Crystal Co., and to carry on the business of electrical, mechanical and general engineers and contractors, garage proprietors, electricians, radio engineers, &c. The first directors are: E. A. Dedman, 75, Woodlands Avenue, New Malden; and N. H. R. Munday, "Crystaldene," Broadhurst, Ashtead, Surrey. Registered office: 63, Kingston Road, New Malden.

Blazeolite, Ltd.—Private company. Registered February 17th. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, engineers and manufacturers, workers and dealers in electricity, &c. The directors are: H. L. Blaiwais, 5, Oaklands, Argyle Road, Ealing, W.; and W. J. Irwin, Las Flores, Cobham, Kent. Registered office: 55, Whitecross Street, London, E.C.

Presco Electrical, Ltd.—Private company. Registered February 17th. Capital, £1,000 in £1 shares. Objects: To carry on the business of wholesalers, manufacturers, repairers and contractors for the sale of and dealers in electrical machinery, instruments, wires, cables, radio goods and apparatus, &c. The directors are: C. W. Edwards, 16, Chelmsford Square, Kensal Rise, N.W.10; and S. N. Wolf, 10, Clifton Gardens, Maida Vale, London, W.9.

Multiplex (Liverpool), Ltd.—Private company. Registered February 19th. Capital, £1,000 in 3,600 7 per cent. non-cumulative participating preference shares of 5s. each and 2,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers of and/or dealers in electric lamps of all types, and all types of lighting equipment, gas and electrical goods, radio goods, &c. The subscribers are: E. P. Griffiths, 104, Priory Road, N.8; and A. M. Barron, 54, Clarence Avenue, Ilford. Registered office: Aldwych House, Aldwych, London, W.C.2.

Nile Electric Co., Ltd.—Private company. Registered in Edinburgh February 7th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric lamps and all electrical apparatus, warehousemen, traders, &c. The directors are: J. Glaister Primrose, 9, Belhaven Terrace, Glasgow, W.2; and A. G. Littledale, Baillieston House, Baillieston.

Cousens Radio & Electric, Ltd.—Private company. Registered February 12th. Capital, £600 in £1 shares. Objects: To carry on the business of dealers in and retailers of radio apparatus, wireless sets and components, electrical apparatus, cycle and cycle accessories, &c. The subscribers are: H. Arbeid, 63/5, Piccadilly, W.1, and W. H. Warman, 19, Blenheim Crescent, W.11. Solicitors: Arbeid & Co., 63/5, Piccadilly, W.1.

A. Reid Manufacturing Co., Ltd.—Private company. Registered February 12th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical, wireless, engineering and chemical machinery, equipment, apparatus, &c. The subscribers are: E. A. Reid, 58, Riverway, Palmers Green, N.13, and W. E. Game, 35, Oakington Avenue, Harrow Garden Village, Middlesex. E. A. Reid signs as director. Registered office: 5, Arundel Street, Strand, W.C.2.

Lawrie & Co. (Radio and Electric), Ltd.—Private company. Registered February 11th. Capital, £5,000 in £1 shares. Objects: To acquire the business of a wholesale electrical and radio engineer now carried on by Lawrence Bass at 2, Albert Road, Bournemouth, as "Lawrie & Co." The directors are: L. Bass and Mrs. L. M. Bass, both of 23, Lowther Road, Bournemouth. Secretary: E. Sworn. Registered office: Adelaide House, 2, Albert Road, Bournemouth.

Belmont Distributors, Ltd.—Private company. Registered February 12th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless sets, television apparatus and wireless and electrical components, &c. The subscribers are: A. J. Jackson, 12, Albert Grove, Nottingham, and A. E. Mowforth, 163, Sutton Passeys Crescent, Wollaton Park, Nottingham. Solicitors: Whitworth & Eccleston, 17, Bridlesmith Gate, Nottingham.

E. M. Precision Equipment, Ltd.—Private company. Registered February 5th. Capital £100 in £1 shares. Objects: To carry on the business of importers, exporters, and manufacturers of and dealers in all kinds of transformers, chokes, relays, coils, controls, switchgear, dynamos, &c. The directors are: H. B. Lyle, 4, Lewis Crescent, Neasden, N.W.10, and three others. Registered office: 46-47, Cheapside, E.C.2.

Institution of Television Engineers, Ltd.—Private company. Registered February 7th. Capital, £100 in £1 shares. Objects: To carry on the business of radio and television engineering in all its branches, &c. The directors are: M. Schreemer, "Littlecote," Filton, Bristol; and R. Oswald, 5, Wades Road, Bristol. Secretary: Margery Schreemer. Registered office: 6, St. Mary's Chambers, 161a, Strand, London, W.C.2.

Distributors (Tate & Co.), Ltd.—Private company. Registered February 15th. Capital, £1,000 in £1 shares. Objects: To carry on the business of distributors of electrical, mechanical and other apparatus, &c. The directors are: A. P. Bunt and Mrs. E. Bunt, 13, Mount Park Crescent, Ealing, W.5.

Returns of Electrical Companies

Broadcast Relay Service, Ltd.—The nominal capital has been increased by the addition of £300,000 beyond the registered capital of £200,000. The additional capital is divided into 6,000,000 ordinary shares of 1s. each. The 4,000,000 ordinary shares of 1s. in the original capital and the above 6,000,000 ordinary shares have been consolidated and divided into 2,000,000 shares of 5s. each. To February 1st, 1936, 1,525,800 had been issued and fully paid up and have subsequently been converted into stock. In July, 1935, the company allotted 543,000 fully paid ordinary shares of 1s. as consideration of shares in Bognor Regis Rediffusion Service, Ltd., County Down Rediffusion Service, Ltd., K.L.M. Radio Relays, Ltd., Midland Rediffusion Service, Ltd., and Nottingham Rediffusion Service, Ltd.

Horton, Smith & Co., Ltd.—H. Reynolds, of 54, Finsbury Court, London, E.C.2, ceased to act as receiver and manager on February 6th, 1936.

Maxim Lamps, Ltd.—Debenture dated February 10th, 1936, to secure sums not exceeding £500 charged on the company's undertaking and property, including uncalled capital. Holders: John Ismay & Sons, Ltd., Roden Street Works, Ilford.

Edmundson's Electricity Corporation, Ltd.—Issue on January 30th, 1936, of £2,000,000 debenture stock, part of a series already registered.

John Ismay (Neon Signs), Ltd.—Capital, £1,005 in 100 ordinary shares of 1s. and 1,000 preference shares of £1. Return dated January 14th, 1936. All shares taken up. £1,005 paid. Mortgages and charges, nil.

Portland Radio Co., Ltd.—Capital, £100 in £1 shares. Return dated October 15th, 1935. All shares taken up. £100 paid. Mortgages and charges, £1,000 debentures.

Barlow & Young, Ltd.—Capital, £500 in £1 shares. Return dated October 22nd, 1935. All shares taken up. £2 paid. £498 considered as paid. Mortgages and charges, nil.

Challis Transformers, Ltd.—Capital, £1,750 in 1,000 8 per cent. cumulative preference and 750 ordinary shares of £1. Return dated October 16th, 1935 (filed January 1st, 1936). 600 ordinary shares taken up. £600 paid. Mortgages and charges, £450. A further 675 preference shares were allotted, payable in cash and fully called up, on November 21st, 1935.

Ship Carbon Co. of Great Britain, Ltd.—Particulars filed of £125,000 debentures authorised January 29th, 1936, constituting a specific charge on real and leasehold property (subject to prior charge on part of the company's real property dated December 1st, 1932) and a floating charge on the other assets and property, including uncalled capital, the whole amount being now issued.

Rhondda Radio Central Exchange, Ltd.—Capital, £10,000 in 8,500 preference shares of £1 and 30,000 ordinary shares of 1s. Return dated October 3rd (filed December 31st), 1935. All shares taken up. £8,325 2s. paid on 8,325 preference and two ordinary shares. £1,674 18s. considered as paid on 175 preference and 29,998 ordinary shares. Mortgages and charges, nil.

B. G. Suthers, Ltd.—Satisfaction to the extent of £500 on January 14th, 1936, of debenture dated April 11th, 1931, and registered April 16th, 1931.

"M.A." Sound System, Ltd.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares beyond the registered capital of £500.

Great Yarmouth Radio Relays, Ltd.—Capital, £6,000 in 3,000 preferred and 3,000 ordinary shares of £1. Return dated January 2nd, 1936. 2,228 preferred and 3,000 ordinary shares taken up. £5,228 paid. Mortgages and charges, nil.

Radio Services (Birkenhead), Ltd.—N. J. K. Smith, 54, Hamilton Square, Birkenhead, was appointed receiver and manager on January 31st, 1936, under powers contained in debenture dated March 15th, 1933.

Trutolife Television Co., Ltd.—Particulars filed of debentures not exceeding £5,000, authorised January 27th, 1936, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £5,000.

Warners Radio, Ltd.—Capital, £1,000 in £1 shares. Return dated December 1st, 1934 (filed August 28th, 1935). 902 shares taken up. £902 paid. Mortgages and charges, nil.

Electrical Devices, Ltd.—S. A. S. Forster, of County Chambers, Martin Road, Middlesbrough, ceased to act as receiver and/or manager on January 31st, 1936.

A. S. E., Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1935. 1,519 shares taken up. £1,519 paid. Mortgages and charges, nil.

Elcap, Ltd.—Capital, £700 in £1 shares. Return dated October 29th, 1935. 600 shares taken up. £300 paid. £300 considered as paid. Mortgages and charges, nil.

Northern Electrical Co. (Grimsby), Ltd.—Capital, £8,000 in £1 shares. Return dated November 11th, 1935. 7,249 shares taken up. £7,249 paid. Mortgages and charges, nil.

British Belmont Radio, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1935. All shares taken up. £100 paid. Mortgages and charges, £3,500.

Vul-K-Lec, Ltd.—A. D. Walker, C.A., of 42, Castle Street, Liverpool, was appointed receiver and manager on February 12th, 1936, under powers contained in debenture dated November 21st, 1934.

City Notes

The Lancashire Electric Light & Power Co., Ltd.—Presiding at the annual meeting held on February 21st Mr. A. Shepherd (chairman) said that during the year trading in all departments had shown a satisfactory improvement. The kWh delivered to the feeders totalled 365,000,000 against 335,000,000 in 1935, and the kWh sold to the company's own consumers rose from 304,000,000 to 330,000,000; sales to the respective classes of consumers had in every case shown an increase. As compared with 1934 there was a large expansion in the output both from Kearsley and Padiham, due mainly to the demands of the Central Electricity Board, and it was hoped that the extensions to the 50,000-kW plant would be completed by August next. The C.E.B. had intimated that the Kearsley station should, in the near future, be extended by a second 50,000-kW set, and it was anticipated that directions to proceed with this set would be received shortly. Due to the better load factors at Kearsley and Padiham there had been a considerable improvement in efficiency and a consequent reduction in the coal consumed per kWh; Kearsley had worked at an exceptionally high load factor throughout the year, and during November the figure of 88.53 per cent. had been reached; this high load factor necessarily increased wear and tear and shortened the life of the plant, and the company looked to the C.E.B. for reimbursement. The Mains Department had been busy with extensions to the l.p. cable systems, which had increased by over 100 miles and the total length of street and road distributing systems now extended to about 860 miles. The h.p. system had also increased during the year by nearly forty miles. The net capital expenditure for the year under review amounted to £413,229, an increase of £105,598 over 1934, and of this the Kearsley extension had accounted for £219,844. The number of consumers connected was 5,680 as compared with 4,890 in the preceding year, and this figure, a record, represented an increase of 16.9 per cent.

Ismay Industries, Ltd.—At an extraordinary meeting held on February 19th a resolution was passed for increasing the capital of the company to £1,150,000 by the creation of 150,000 first preference shares of £1 each and 1,000,000 ordinary shares of 5s. each, all such shares being at the disposal of the directors. Mr. J. Ismay (chairman), who presided, said that the board intended to extend the business of the company into new lines, particularly the manufacture of paper-insulated cables. They were already interested in the making of certain types of light insulated cables, but the paper cable was quite a different proposition. It needed a large factory, expensive plant, and people who understood the business, but the profits to be made in that business were large. They had secured the services of Mr. E. W. Moggridge, late managing director of the Derby Cable Co. They also intended to embark upon the mass production of electric clocks. Their refrigerator business also required more capital. With regard to their lamp business they were shortly introducing a new type of low-voltage neon lamp which gave an exact reproduction of daylight.

Waste Heat & Gas Electric Generating Stations, Ltd., report a net profit for the year ending January 31st last of £31,095, against £30,123 for the preceding year. To this is added £26,263 brought in, making £57,358. Reserve receives £13,282, and it is proposed to pay a final dividend of 5½ per cent., less tax, making 8 per cent. for the year (same) and leaving £18,476 to be carried forward (against £26,513). An extraordinary meeting of the company will be held on March 16th to authorise the capitalisation of reserves. A sum of £80,000 from the reserve of £105,000 will be capitalised and applied in paying up in full 160,000 preference shares which will be allotted to ordinary shareholders in the proportion of one for every two ordinary shares held.

Mather & Platt, Ltd.—Presiding at the annual meeting held on February 25th, Mr. L. E. Mather (chairman) said that the new development in automatic fire protection in ships was making steady progress, and their "Mulsifyre" system for use against burning oil was becoming more widely known. Both these developments had now taken their place as part of their regular productions. With regard to their textile machinery business, they had acquired the goodwill and the whole of the rights of the textile portion of the business of Messrs. Bentley & Jackson, of Bury. Their electrical and pump sections had had a busy year, both at home and abroad. India continued to be the most important of their overseas markets, as its industrial requirements were such that all their departments had a share in the business to be obtained.

Electrical Distribution of Yorkshire, Ltd., held its annual meeting on Tuesday last, when Mr. R. W. Wickham, who presided, said that the number of consumers connected during this year totalled over 10,000. The use of electricity for street lighting was also increasing. Mr. W. B. Woodhouse (managing director) referred to the two subsidiary companies in Cumberland and said that they were making good progress. During the past year the kWh sold increased from 2,680,000 to 4,500,000, and the number of consumers' services from 3,538 to 5,039. The Mid-Cumberland Co. had established a supply in sixty-eight villages and in twenty-five parishes electric street lighting was adopted. The generating station of the Penrith Co. had been closed down and an agreement made with the Central Electricity Board for a bulk supply.

The Midland Counties Electric Supply Co. reports that the trading profit of the undertakings which it owns and operates amounted to £628,100 in 1935 as against £550,228 for 1934. The gross income of the holding company amounted to £351,537 (against £341,895) and the net profit to £301,600 (£292,899). Investment reserve receives £32,665 and the final ordinary dividend is 5 per cent., making 7½ per cent. for the year (against 7 per cent), leaving £7,864 to be carried forward. The report states that the growth of the business of the supply undertakings shows a satisfactory expansion. Further extensions to deal with new business are in progress. Additional generating plant is being installed in the Spondon power station and will be in operation before the end of the current year. The improvement in the earnings of the traction properties has been maintained. Meeting: March 2nd.

The Lancashire Dynamo & Crypto, Ltd., reports a profit for 1935 of £34,764, as compared with £16,212 in the preceding year. To this is added £12,481 brought in, making £47,245 available. The ordinary dividend for the year is 10 per cent. (against 5 per cent.), £1,000 is allocated to the staff pension fund, and £23,537 is carried forward. The report states that trading conditions during the year were satisfactory, both works being fully occupied. A subsidiary company with the title Crypton Equipment, Ltd., has been formed to deal with the company's battery-charging, cinema and rectifier business.

The London Electric Supply Corporation, Ltd., reports a total revenue for 1935 of £844,348 and expenditure of £761,268, leaving a profit of £83,080, a decrease of £7,794. To this is added £70,780 brought in and interest on investments, &c. (£31,180), making £185,041 available. The final ordinary dividend is 4 per cent., making 7 per cent. for the year (same), and it is proposed to make a bonus distribution of 1 per cent. on the ordinary shares, being a proportion of the consumers' benefit. No. 2 reserve fund receives £6,889 and £66,270 is carried forward. The sales of electricity during the year amounted to 343,207,758 kWh, as compared with 325,211,132 kWh in 1934. Meeting: March 3rd.

The Telegraph Construction & Maintenance Co., Ltd., reports a net profit for 1935 of £432, as compared with a net loss of £8,903 for the previous year. To this is added £29,953 brought in, making £30,385 to be carried forward. The report states that the manufacturing interests of the company which relate to submarine cables having insulation of a plastic material, were amalgamated with those of Siemens Bros. & Co. in October last, and a separate company was created named Submarine Cables to carry this arrangement into effect. In consequence of this union the accounts contain the results of only nine months' trading on the submarine cable side and in that period orders received show an improvement on those for the same period of 1934. Meeting: March 3rd, 1936.

The Mid Southern Utility Co. reports a gross revenue for 1935 from the electrical side of its business of £147,779, as compared with £122,464, and a net revenue of £64,059 (against £57,164). To this is added net revenue from gas (£27,647) and water (£11,498), interest and £27,609 brought in, making £129,912, and after deducting debenture interest, &c., there is a net profit of £28,629 (£27,609). The directors recommend the full statutory dividends of £6 5s. 6d. per cent. per annum on the "A" stock; £4 15s. 6d. per cent. per annum on the "B" stock; and £5 per cent. on the "C" stock for the latter half of the year.

The Midland Electric Manufacturing Co. is paying a final dividend on the ordinary shares of 10 per cent., plus a bonus of 15 per cent., both less tax. This is at the same rate as for the previous year, no interim dividend having been paid.

J. & F. Store Lighting & Radio has declared an interim ordinary dividend of 5 per cent. This is at the same rate as in the previous year, but on larger capital.

The Western Electricity Supply Co. has announced an interim ordinary dividend of 4 per cent. (unchanged).

The Clyde Valley Electrical Power Co. has announced a final dividend of 5 per cent. on the ordinary shares, making 8 per cent. for the year (same).

The North-Eastern Electric Supply Co., Ltd., is paying a final ordinary dividend of 3½ per cent., maintaining the distribution for the year at 6 per cent.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets continue to present many points of interest. In various departments business is animated. Some brokers and dealers in the House have been working to capacity. A thousand bargains a day no longer constitute a record for a single firm. The rush to buy aviation and armament shares had the effect of taking prices along more rapidly than was warranted. Heavy selling ensued and the reaction spread to markets generally. The Continental outlook is obscure: the vague and nebulous war-talk plays its part in enjoining a caution that merges into restraint. But prices, taking them all round, are remarkably good, despite reactions. The weight of money is still the determining factor in the control of Stock Exchange prices.

Much interest was taken by the City in the view, expressed last week by Mr. J. M. Keynes, that the rates of interest obtainable from investments in industrial shares are, at the present time, too high in comparison with those afforded by gilt-edged stocks. Mr. Keynes's opinions are entitled to serious consideration, and they may well be responsible in part for the present tendency of prices to move in the directions indicated by him. There are, however, other influences which are affecting prices in the same way. Government stocks are encouraged by the publication of consistently good revenue figures, and by the estimates of a satisfactory balance of the nation's invisible exports. Many industrial shares, on the other hand, have reached levels at which the dividend prospects are discounted for a long way ahead, and at which tempting profits are offered to people who have held the shares for a reasonable period.

The slightly brighter atmosphere of the gilt-edged market has not affected the stocks of the Central Electricity Board. The Board's newly issued 3¼ per cent. loan is back at par. London Passenger Transport Board "A" and "B" stocks

are ½ and 1 point lower at 126½ and 129½ respectively, but the "C" stock recovered 3 points of the recent fall. The price is now 105¼ ex-dividend. Railway Finance Corporation 2½ per cent. guaranteed scrip stands at "par," that is, the issue price of 97.

Electricity Supply Shares

Changes in the prices of the shares of electricity supply companies are few and irregular. Dividend announcements or reports have been issued during the week by several more companies, among them being the County of London, London Electric, South London, Midland Counties, Yorkshire, Lancashire, and Northampton Electric. The companies are almost unanimous in their statements of substantially increased output and revenue, and in maintaining, or—as in the case of Midland Counties—slightly increasing their dividend rates. Share prices have not generally responded to this evidence of the increasing consumption of electricity in all parts of the country, including the Northern industrial areas, the results having been pretty well anticipated. Confidence in the future of the industry is too strong to be taken by surprise, and good results are regarded merely as confirmations of expectations. The only changes of note in the list of prices are a rise of 1/16 to 3 1/8 in Bournemouth and Poole, and a fall of 1s. 6d. to 58s. in County of London, following the report that the London Joint Authority is to oppose this company's new development scheme. Yorkshire Electric and Electric Distribution of Yorkshire are 6d. and 1s. lower respectively. City of London and South London are both 6d. higher.

Stocks on Offer

The Metropolitan Electric Company's 3 per cent. debenture, offered a fortnight ago, and now 50 per cent. paid, can be bought at about par, free of stamp duty and fee. The company's profits for 1934 were sufficient to cover the £30,000 required for annual interest on this stock more than fourteen times. The slightly higher yield of £3 5s. 9d. per cent. is obtainable from Edmundson's Electric 3¼ per cent. debenture stock, of which a line is still available at the issue price of 98½. The stock can be bought free of stamp duty and fee. The annual interest required in respect of this loan is covered about four times by the Corporation's last-published earnings. It would be difficult to find, outside the purely Trustee list, stocks which offer greater security for investment than that provided by issues such as these.

Manufacturing and Equipment

It is still difficult to mark any decided disposition in the prices of electrical equipment shares. At times, it looks as if the upward movement is again getting under way, but every advance seems to encourage sales by holders who apparently think that future prospects are discounted for the time being. The steady appreciation of Associated Electrical shares has at length suffered a set-back. At 47s. they are 2s. lower on the week. General Electrics, at 78s., have also lost ground and are 3s. lower. Prices of cable manufacturers' shares have been subject to fluctuations which, however, left British Insulated and Johnson and Phillips unchanged on balance, but raised Enfields 2s. 6d. to 130s. English Electric ordinary are flat at 19s., having shed a further 3s. 6d., and the preference are 1s. 6d. easier at 3s. Crompton Parkinsons, with a loss of 2s. 6d. to 63s. 9d., are another dull spot. Hall Telephones at 21s. 3d. ex dividend, have recovered 1/16. The company's report indicates more profitable trading in 1936. Ericssons, on the other hand, lost 1s. 3d. to 41s. 3d.

Internationals

American stocks generally have resumed some of the buoyancy which the Tennessee Valley decision momentarily checked. Brazil Tractions came in for further support after the signing of the agreement relating to the settlement of commercial debts in Brazil. The shares, which are of no par value, spurted ⅛ to 15 before reacting to 14⅞. Hydro Electric failed to benefit, but International Holdings are 1/16 higher at 2¼. "Emmies" (Electric and Musical Industries) are also an active market. The company is reported to be very busy just now, and it is believed that a new scheme is about to be brought into operation which will effect substantial internal economies. The shares rose about 2s. during the week but fell back 1s. 3d. to 28s. 3d. The market was well pleased with the announcement made by the Electrolux Corporation of America, of a dividend of 40 cents, plus 10 cents. in respect of the quarter just ended. The shares are up to 26½ on the hopes that the Corporation's progress will be good enough to allow a repetition of this distribution for the remaining three quarters of the year. American Telephone and Telegraph reacted to 172½, a loss of 5 points. Anglo-American Telegraph preferred gained 1 to 125½.

Miscellaneous Matters

Cable and Wireless stocks at one time were inclined to rally, but a measure of disappointment with the January traffics index, which is less satisfactory than the previous January's, set prices back to their former levels. There was heavy oversubscription for the new British Vacuum Cleaner 5½ per cent. preference £1 shares, which were offered at 22s. Dealings in the Stock Exchange began at 1s. premium. The ordinary shares, which are now of 5s. each, are quoted at 28s. 9d. This is equivalent to 155s. in their old form. Revo Electrics have improved by about ½, active business being done in the shares up to nearly £2.

Share List of Electrical Companies

	Nom.	Dividend. 1933.	Dividend. 1934.	Price Feb. 25	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	3 1/8	+1/16d.	3 16 2
City of London	1	7½	7½	39/6	+6d.	3 16 0
Clyde Valley	1	7	8	46/–	—	3 9 7
County of London	1	10½	10½	58/–	–1/6	3 12 5
Edmundson's 7% Pref.	1	7	7	36/6	—	3 16 9
Do. Ord.	1	7	8	45/6	—	3 10 4
Elec. Dis. Yorkshire	1	9	9	48/–	–1/–	3 15 0
Elec. Fin. and Securities	1	12½	12½	3 7/16	—	3 12 9
Elec. Supply Corporation	1	11	11	65/9	—	3 7 0
Lancs Light and Power	1	7½	7½	39/–xd	—	3 17 0
Lond. Assoc. Electric	1	—	—	35/6	–6d.	3 19 0
London Electric	1	7	8	40/–	—	4 0 0
London Power Deb. Red.	Stock	5	5	108½	–1	4 12 2
Metropolitan	1	10	10	54/–	—	3 14 1
Midland Counties	1	7	7½	41/6	–6d.	3 12 3
Mid. Elec. Power	1	8	8	42/6	—	3 15 3
North Eastern Electric Ordinary	1	6	6	36/6	—	3 5 8
Do. 7% Pref.	1	7	7	35/6	—	3 19 0
Northampton	1	10	10	53/9	—	3 14 5
Notting Hill 6% Pref.	10	6	6	14½	—	4 2 9
North Met. Elec. Ordinary	1	10	10	62/–	—	3 4 6
Do. do. 6% Pref.	1	6	6	32/–	—	3 15 0
Scottish Power	1	8	8	43/9	—	3 13 2
South London	1	7	7	35/–	+6d.	4 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	25/6	—	5 17 8
Yorkshire Elec.	1	8	8	47/6	–6d.	3 7 4
PUBLIC BOARDS.						
Central Electricity 1950–70	Stock	5	5	116	—	4 6 2
Do. 1955–75	„	5	5	120	—	4 3 4
Do. 1951–73	„	4½	4½	112	—	4 0 4
Do. 1963–93	„	—	3½	104	—	3 7 4
London Elec. Trans. Gtd.	„	—	2½	96½	—	2 11 10
London & Home Counties, 1955–75	„	4½	4½	112	—	4 0 4
London Passenger Transport, A.	„	—	4½	126½	–½	3 11 2
Do. do. B.	„	—	5	120½	–1	3 17 3
Do. do. C.	„	3½	4	105½	+3	3 15 10
West Midlands Joint Elec. 1948–68	„	—	5	116½	—	4 5 10
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$100	9	9	172½	–5	5 4 4
Anglo-Am. Tel. Pref.	Stock	6	6	125½	+1	4 15 7
Do. Def.	„	1½	1½	30	—	5 0 0
Cable & Wireless 5½% Pref.	„	2¾	4½	110½	–½	3 14 8
Do. A. 7½% Ord.	„	Nil	Nil	29	–½	—
Do. B. Ord.	„	Nil	Nil	8¾	—	—
Globe Tel. & Tel. Ord.	10	2½	3½*	16½	–½	2 3 4
Do. do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	42½	—	4 14 1
Marconi-Marine	1	10	7½	36/3	—	4 2 9
Oriental Telephone Ord.	1	12	12	3½	—	3 13 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	9d.	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	6	—	—
British Electric Traction Df. Ord.	„	5	5	175	+10	—
Do. do. Pref. Ord.	„	8	8	177½	+1½	4 10 2
Brazil Traction	100	—	—	14⅛	+⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	98½	—	5 1 6
Mexican Light Common	100	Nil	Nil	3½	—	—
Do. 7% Pref.	100	7	7	7½	—	—
Do. 1st Bonds	$500	5	5	57½	+5	—
Victoria Falls Ord.	1	20	20	3 1/16	+1/16	—
West Riding	1	5	6½	52/6	—	2 9 6
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	15	66/3	—	4 10 7
Assoc. Elec. Ord.	1	4	6	47/–	–2/–	2 11 1
Do. Pref.	1	8	8	39/–	—	4 2 1
Babcock & Wilcox	1	6	8	54/–	+3d.	2 19 3
British Aluminium Ord.	1	5	7½	46/3	+3/–	3 4 10
British Insulated Ord.	1	5	15	5 1/8	—	2 17 10
Brush Ord.	Stock	Nil	Nil	44	—	—
Callender's	1	15	15	4½	—	3 12 10
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord.	5/–	—	12½	63/9	–⅛	0 19 7
Do. 8% Pref.	1	8	8	38/9	—	4 2 7
Edison Swan 1st Pref.	1	7½	7½	30/–	–⅛	5 0 0
Electric Construction	1	Nil	3½	1⅞	—	1 17 4
Enfield Cable Ord.	1	25	25	6½	+⅛	3 17 0
English Electric	1	Nil	Nil	19/–	–3/6	—
Do. do. Pref.	1	Nil	Nil	23/–	–1/6	—
Ericsson Tel.	5/–	—	24	41/3	–⅛	—
Ever Ready	5/–	35	35	24/6	—	7 2 10
Ferranti Pref.	1	7	7	26/3	—	5 6 8
G.E.C. Pref.	1	6½	6½	34/–	+6d.	3 16 6
Do. Ord.	1	8	10	78/–	–3/–	2 11 3
Henleys	1	30	30	7½	–⅛	4 0 0
Do. 4½% Pref.	5	4½	4½	5½xd	—	3 18 3
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	5	7½	48/9	—	3 1 7
Siemens Ord.	1	6½	4	28/9	—	2 15 8
Telegraph Construction	£1	Nil	Nil	27/6	–½	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

27713. "Clockwork operated electric switches." H. E. R. Kingsbury. November 7th, 1934. (441842.)

1934

12968. "High-frequency signalling systems." British Thomson-Houston Co., Ltd. April 29th, 1933. (442003.)

18763. "Means for separating one set of electrical oscillations from another, suitable for use in television and like systems." M. Bowman Manifold. June 25th, 1934. (441847.)

18876. "Electron discharge devices." C. S. Bull and J. E. Keyston. June 26th, 1934. (441849.)

21306. "Wireless receiving or transmission apparatus." E. Cohn. July 20th, 1934. (Convention date not granted.) (441851.)

21786. "Frequency-selective electrical devices." Siemens & Halske, Akt.-Ges. July 25th, 1933. (441862.)

22002. "Electrical signalling systems." Automatic Electric Co., Ltd., T. R. Rayner, G. A. Burns and H. S. Woodhead. July 27th, 1934. (Cognate application 29501/34.) (441881.)

22059. "Road signalling apparatus." F. D. Norton and J. F. W. Stuart. July 28th, 1934. (442079.)

22091. "Contacts for electric switches and the like." Igranic Electric Co., Ltd., and W. F. Grafton. July 28th, 1934. (441931.)

22178. "Electrical storage batteries or accumulators." Three Star Accumulators, Ltd., and F. C. Grund. July 30th, 1934. (442022.)

22217. "Production of electric steel." W. Schwier. July 2nd, 1934. (442026.)

22227. "Dynamo-electric machines." J. W. Swendsen. July 30th, 1934. (442028.)

22995. "Electric lighting devices." E. Greetham. August 9th, 1934. (441888.)

23356. "Adjustable resistance or potentiometers." Elektrische Gluhlampenfabriken J. Kremenezky, Akt.-Ges. August 11th, 1933. (442032.)

24878. "Control systems for electrically actuated rolling-mill screw-down gear." E. H. M. Langley, H. N. George and Associated Electrical Industries, Ltd. August 29th, 1934. (441941.)

25322. "Electric-arc convertors." General Electric Co., Ltd., and H. H. Taylour. September 3rd, 1934. (442092.)

26199. "Manufacture of electric incandescent lamps." General Electric Co., Ltd., and G. Chelioti. September 12th, 1934. (441891.)

27631. "Alternating current supply systems." British Thomson-Houston Co., Ltd. September 26th, 1933. (441892.)

29308. "Electric primary cells." C. J. Gordon. October 12th, 1934. (Cognate application 27052/35.) (441894.)

29381. "Electric gaseous discharge lamps." F. J. G. Van Den Bosch. October 27th, 1933. (441895.)

30549. "Television." L. Gabrilovitch, V. Isnard and R. Berthon. October 25th, 1933. (441896.)

31924. "Means for suppressing interference with the reception of radio transmissions caused by small motors and other electrical apparatus." Belling & Lee, Ltd., and E. M. Lee. November 6th, 1934. (442099.)

34738. "Electric condensers." Dubilier Condenser Co. (1925). Ltd. May 24th, 1934. (441901.)

35295. "Cathode-ray tubes." F. H. Nicoll and L. F. Broadway. December 7th, 1934. (442103.)

37185. "Ceramic structures for use in high-frequency electrical apparatus." Telefunken Ges. für Drahtlose Telegraphie. December 28th, 1933. (441959.)

37373. "Lightning arrestors." R. H. Earle and A. G. Steinmayer. December 31st, 1934. (441905.)

1935

862. "Automatic telephonic time-announcing means." R. Brennan. January 10th, 1935. (441961.)

2832. "Radio direction-finding systems." Telefunken Ges. für Drahtlose Telegraphie. January 27th, 1934. (441964.)

3373. "Electrical measuring instruments." J. T. Shevlin (Deuta-Werke vorm. Deutsche Tachometerwerke Ges.). February 1st, 1935. (441908.)

4602. "Tell-tale devices for indicating the failure of an electric circuit." F. G. Donaldson. February 13th, 1935. (442107.)

6933. "Apparatus for the electrical separation of mixed particles." Metallges Akt.-Ges. March 9th, 1934. (441965.)

9138. "Mercury power plants." British Thomson-Houston Co., Ltd. March 23rd, 1934. (441910.)

9872. "Clamping device for overhead electric lines." C. L. Delachaux. March 29th, 1935. (442110.)

10642. "Apparatus for measuring magnetic properties." Siemens & Halske, Akt.-Ges. April 7th, 1934. (Cognate application 10543/35.) (441968.)

11260. "Television." A. Karolus. April 19th, 1934. (441969.)

12165. "High-frequency signalling systems." Hazeltine Corporation. May 31st, 1934. (441970.)

12685/7. "Automatic arc lamp mechanism." Sperry Gyroscope Co., Inc. June 26th, 1933. (Divided out of 441848.) (441913/4.)

14861. "Lampholders for electric lights for sewing machines." G. M. Pfaff, Akt.-Ges. December 6th, 1934. (442114.)

16363. "Circuit arrangements for effecting the exchange of energy between alternating current and direction current mains networks." Siemens-Schuckertwerke, Akt.-Ges. June 7th, 1934. (441917.)

16386. "Electric resistances." British Thomson-Houston Co., Ltd. June 7th, 1934. (441977.)

21637. "Variable inductance coils." Marconi's Wireless Telegraph Co., Ltd. (Telefunken Ges. für Drahtlose Telegraphie.) July 30th, 1935. (441982.)

22614. "Electic-discharge lamps." British Thomson-Houston Co., Ltd. August 10th, 1934. (441985.)

22908. "Telegraphic transmitters." C. Bottino. August 14th, 1935. (441986.)

23093. "Protective devices for electric circuits." British Thomson-Houston Co., Ltd. August 17th, 1934. (441987.)

25992. "Electric ironing or pressing machines." British Thomson-Houston Co., Ltd. September 20th, 1934. (441992.)

28846. "Electric switchgear structures." British Thomson-Houston Co., Ltd. October 20th, 1934. (441998.)

29181. "Electrical signalling systems." Automatic Electric Co., Ltd., T. R. Rayner, G. A. Burns and H. S. Woodhead. July 27th, 1934. (Divided out of 441881.) (441999.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 19th:—

Pearl. No. 563666. Sapphire. No. 563667. Topaz. No. 654242. Ruby. No. 564243. Beryl. No. 564246. Class 8. Electric batteries (not for medical purposes).—Jewell Battery Co., Ltd., 7, Lincoln's Inn Fields, W.C.2.

Magicmetal. No. 563827. Class 8. Coils for use in wireless telephony and telegraphy.—Universal Importers, Ltd., 25-27, Oxford Street, W.1.

Railex. No. 564436. Class 8. Electric batteries for train-lighting purposes.—Chloride Electrical Storage Co., Ltd., Clifton Junction, near Manchester.

Glitto. No. 565768. Class 13. Electric lamps (ordinary).—A. Lloyd, 4, Hillersdon Avenue, Edgware, Middlesex.

His Master's Voice (lettering and design). No. 564424. Class 13. Electric smoothing irons.—Gramophone Co., Ltd., Blyth Road, Hayes, Middlesex.

Barlux Tube Lamps; Lighting Made to Measure (lettering and design). No. 564465. Class 13. Electric lamps (ordinary).—Tubelamps, Ltd., 4, London Wall Avenue, E.C.2.

Sun-Glade Electric Fires (lettering and design). No. 564790. Class 18. Electric fires.—Artic Fuse and Electrical Manufacturing Co., Ltd., Elisabeth Avenue, Birtley, Co. Durham.

This photograph was taken at the annual dinner of the Electrical Trades Commercial Travellers' Association, a report of which appears on page 323. The chairman (Mr. S. Johnson) and Mr. C. Wilson (of the General Electric Co., Ltd.), who deputised for Mr. M. J. Railing, are seen standing

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Welsh National Library (£50,000) with electrical work; H. Willcock & Co., Ltd., builders, Darlington Street, Wolverhampton.

Ashton-under-Lyne.—Schools, Stalybridge Road; director of education.

Ayrshire.—Ante-natal clinic at Galston, electrical work; William Reid, county architect, Ayr.

Beckenham.—Public baths, electrical work (£37,500); H. Storr Best, borough engineer.

Bedfordshire.—School, Shefford (£16,660), for County E.C.; education architect, Bedford.

Berkshire.—County boys' school, Windsor, for County E.C.

Bexley.—Cinema, Bells Grove, Welling, for M. Feather.

Birmingham.—Additions to the Austin Motor Company's Longbridge Works (£399,000); plans prepared by own staff.

Bishop Auckland.—Houses (26), Sedgefield-Auckland Road; G. W. Lazenby & Co., builders, Ferry Hill.

Boston.—Regal cinema (electrical work), West Street; Alfred J. Thraves, architect, Victoria Street, Nottingham.

Brighton.—Houses (200), Hodshrove estate (£69,215); borough engineer. Hotel, Chichester Drive, and flats, Marine Drive, Saltdean; Saltdean Estate Co., Ltd. Houses (200), East Moulscombe estate; borough surveyor.

Bristol.—Mental Hospital, Barrow Gurney (£250,000), with electrical work; H. Willcock & Co., Ltd., builders, Darlington Street, Wolverhampton.

Bromsgrove (WORCESTERSHIRE).—Houses (36), Stourbridge Road; Mardon & Kraines, architects, Smallbrook Street, Birmingham.

Burnley.—Extensions to municipal college (£22,965); borough surveyor.

Bury St. Edmunds.—Municipal offices and clinics; borough surveyor. Cinema, Brentgovel Street, for the Odeon Theatres, Ltd., Cornhill House, Bennett's Hill, Birmingham; Harry W. Weedon, architect.

Carlisle.—Church, Currock Road, for the Methodist trustees; J. S. Stout, architect, 36, Lowther Street, Whitehaven.

Carluke (LANARKSHIRE).—Cinema; M. Burns, cinema proprietor, The Alhambra, Carluke.

Cheshire.—Elementary school, Harrytown Lane, Bredbury, near Stockport, for County E.C.; F. Anstead Browne, county architect, The Castle, Chester.

Colchester.—Public library, electrical work; M. Sisson, architect, Dedham.

Consett.—Large garage, Leadgate Road, for the Northern General Transport Co., Ltd.; A. H. Fennell, architect, Bridge End Chambers, Chester-le-Street.

Coventry.—Shops, &c., for Coventry Business Estates, Ltd.

Dagenham.—Music hall and shops, Beacontree Heath, for D. J. James, Mayfair Cinema.

Darton (YORKSHIRE).—Houses (45), Redbrook; U.D.C. surveyor.

Dudley.—Houses (54), Bradford Road and Cochrane Road, Woodsite estate; borough engineer.

East Lothian.—Houses (297), for C.C.; county surveyor, Haddington.

Edinburgh.—Hosiery factory and offices for James Hall & Co. (Edinburgh), Ltd., Hutchison Road; the manager.

Epsom.—Swimming baths (£61,820); Baths Committee.

Foots Cray.—Factory, Sidcup by-pass road; Supervents, Ltd., Wallis Works, Bower Road, London, E.9.

Gateshead-on-Tyne.—Cinema, High Street; E. M. Lawson, architect, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Girvan.—Houses (50); burgh surveyor.

Glasgow.—Houses, Berryknowes, and tenements, Ballindalloch; housing director.

Gorleston-on-Sea.—Cinema, High Street; E. Norman Bailey.

Gravesend.—Swimming baths (£20,255); borough engineer.

Herefordshire.—Central schools, Ross; director of education, Hereford.

Hertfordshire.—County offices, Leahoe estate, Hertford (£200,000); James & Bywaters & Rowland Pierce. Schools, Cuffley and London Colney; county surveyor.

Ickenham (MDDX).—School, Bushey Road (£15,646); E. Plaistowe & Sons, Ltd.

Ilford.—Factory, Eastern Avenue, Chadwell Heath, for Frederick King & Co., Ltd., Belfast.

Irish Free State.—(THURLES, Co. TIPPERARY).—Houses (101); T. J. Hyland, engineer and town surveyor, Thurles. (KILDARE). —Houses (1,000); Kildare Board of Health.

Isle of Man.—Schools, Braddan, for E.C.; A. J. Davidson, architect, Talbot Chambers, 16, Atholl Street, Douglas.

Kent.—Mental institution (£750,000); county architect, Maidstone.

Kilmarnock.—Extensions (£45,000) to Burnside Carpet Mills, for Blackwood, Morton & Sons, Ltd.

Kirkcaldy.—Houses (240); Deas & Bertram, architects, Kirkcaldy.

Leicestershire.—County offices, Friar Lane, Leicester; county architect.

Little Thurrock (ESSEX).—Cinema (electrical work), for A. E. Abrahams; Frank Matcham & Co., architects, Warwick Street, London, W.C.1. Houses (700), Hangman's Wood estate; F. C. Stark, builder.

Liverpool.—R.C. school (400 places), Fazakerley housing estate; R.C. authorities.

Lockerbie (DUMFRIESSHIRE).—Houses (40), Sherwood Park, for Thomas Henderson.

London.—(BERMONDSEY).—Buildings, 138-151, Drummond Street; Wallis Gilbert & Partners, 15, Elizabeth Street, London, S.W.1. (L.C.C.).—Development of 64-acre site, Stoke Newington, and reconstruction or building of schools in Bermondsey (£64,000), East Dulwich (£31,385), Lambeth (£43,670), and Norwood (£21,775); architect, County Hall, S.E.1. (ST. PANCRAS). —Buildings, Euston Market site; Richardson & Gill, 41, Russell Square, London, W.C.1. (WANDSWORTH).—Tenements. Greyhound Square (£33,216); borough engineer. (WESTMINSTER).—Clinic, Bessborough Street (£36,593); Prestige & Co., Ltd., 149, Grosvenor Road, S.W.1.

Loughborough.—College (£39,155); William Moss & Sons, Ltd.

Macclesfield.—Silk factory for Brocklehurst-Whiston Amalgamated Co., Hurdsfield mills; F. C. Sheldon, architect, 7a, King Edward Street.

Manchester.—Houses (306), Millgate Lane, Didsbury; Amalgamated Building Co., Queens' Buildings, St. Peter's Square, Stockport. Houses (73), Heald Place, Rushholme; Booth & Sons, 14, Holmleigh Avenue, Blackley. Cinema, shops and residential flats, Wilmslow Road and Willow Bank, Fallowfield; C. A. Noble, architect, 41, John Dalton Street.

Margate.—Hotel with 90 bedrooms; John A. Hallwood, Ltd., builders.

Middlesex.—Grammar school, Tottenham (£47,654); county architect.

Montrose.—Buildings for the Montrose Royal Asylum (£27,750); medical superintendent.

Newcastle-on-Tyne.—Cinema, Armstrong Road, Benwell; E. J. Hinge, Ltd., cinema proprietors, 72, Grey Street, Newcastle-on-Tyne. Alterations to the Saxone Shoe Co., Grainer Street; D. Grant & Son, builders, St. James' Place, Edinburgh.

Norwich.—Technical college and school of art, and school, Catton Grove estate; director of education.

Nottingham.—Cinema (1,400 seats), Valley Road and Nottingham Road, Basford; A. J. Thraves, architect.

Purfleet.—Houses (56); C. S. H. Hawkes, U.D.C. surveyor.

Rawtenstall.—Houses (26), Kirkdale Avenue; Greendale Land Co., Ltd.

Redcar.—Estate development, Sandy Lane; Westfield Estate, Ltd.

Renfrewshire.—Secondary school, Clarkston, for C.C.; J. C. Fraser, county clerk, Paisley.

Roxburghshire.—Schools, Kelso (£40,000); director of education, St. Boswells.

St. Helens.—Police offices, courts, fire station, &c. (£104,154), and houses (200); A. P. Statham, borough engineer.

Salisbury.—Theatre and cinema, Fisherton Street, electrical work, for the Phœnix Theatre, Salisbury, Ltd.; Lionel S. Youngman, architect, Bournemouth.

Smethwick.—Extensions to hospital, Holly Lane; Smethwick & Oldbury Joint Board.

Somerset.—Public library, Burnham-on-Sea, for C.C.

Southend-on-Sea.—Houses (56); W. W. G. Parker, builder, Ongar.

South Shields.—Houses (76), Harton (£21,255); borough engineer.

Springhead (LANCASHIRE).—Houses (20); Taylor, Roberts & Bowman, architects, 10, Clegg Street, Oldham.

Stockport.—Extensions to the infirmary (£36,000); Thos. Worthington & Sons, architects.

Stockton-on-Tees.—Houses, near Billingham Road, for A. Cohen. "Engadine," Stockton-on-Tees, and Robinson's Land; G. P. Stainsby, architect, 25, High Street. Houses (164), Norton House estate; Kendrews (Builders), Ltd., 54, Victoria Road, Middlesbrough. Shops, garage and showrooms, Grangefield Road; W. Marsh, builder, 5, Ramsgate, Stockton-on-Tees.

Stornoway.—Premises for the Scottish Co-operative Wholesale Society, Glasgow.

Stratford-on-Avon.—Houses (68), Walnut Tree estate, Clopton Road, for F. Kendall & Son.

Sunbury-on-Thames.—Houses (28), Green Lane; A. J. Buttress, U.D.C. surveyor.

Sunderland.—Houses, Sidecliff Park estate; E. & J. Purvis, builders, Garcia Terrace, Sunderland.

Surrey.—Boys' secondary school, Epsom, and central school, Caterham (£18,010), for County E.C.; secretary, Kingston-on-Thames. Schools, Stoneleigh, Cheam (£29,106), for County E.C.; Grave & Marsh, Ltd., builders.

Sutton Coldfield.—Houses (26), Lichfield Road; H. H. Lasky. Senior school, Holland House estate, for E.C.

Tankerton (KENT).—Development of South Tankerton estate; E. J. Pout & Sons.

Taunton.—Printing works, Priory Bridge Road, for Barnicott & Pearce.

Thorne.—Three schoools, for E.C.

Totnes.—Cinema for the Cinemas Totnes, Ltd.

Upholland.—Houses (34); John Johnson & Son, builders, Caroline Street, Wigan.

Ventnor.—Houses (40); U.D.C. surveyor.

Wallsend-on-Tyne.—Houses, Bewicke estate; borough surveyor.

Walsall.—Houses (600), Ryecroft, and library and reading room, Bloxwich; borough surveyor.

Weymouth.—Hotel, with dance hall (£24,000), Bowleaze, and flats, Lodmoor; Stewart Smith, architect.

Whickham-on-Tyne.—Houses (62), Dunston Gardens estate; W. Leech, builder, Coutts Road, Walkergate, Newcastle-on-Tyne.

Wigan.—Cinema, Station Road, for the Union Cinema Co., Ltd., 167, Wardour Street, London, W.1. Grammar School (£35,000) with electrical work; Hy. Willcock & Co., Ltd., builders, Darlington Street, Wolverhampton.

Wincanton.—Houses (20), Milborne Port; R. Earnshaw, architect, Council Offices.

Worksop.—Houses (30), Harworth, for Tame & Co.

Yeovil.—Houses (128) and flats, Lower Larkhill Lane; borough surveyor.